PB-216 238

FEASIBILITY STUDY ON THE APPLICATION OF VARIOUS GROUTING AGENTS, TECHNIQUES AND METHODS TO THE ABATEMENT OF MINE DRAINAGE POLLUTION. PART II. SELECTION AND RECOMMENDATION OF TWENTY MINE SITES

Halliburton Company
Duncan, Oklahoma

23 August 1967

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PB 216 238

Monongahela River Mine Drainage Remedial Project
Upper West Fork River Sub-basin
West Virginia

FEASIBILITY STUDY ON THE APPLICATION OF VARIOUS GROUTING AGENTS, TECHNIQUES AND METHODS TO THE ABATEMENT OF MINE DRAINAGE POLLUTION

PART II

SELECTION AND RECOMMENDATION OF TWENTY MINE SITES

Details of illustrations in
this document may be better
studied on microfiche.

Prepared for the
U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

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AUGUST 23, 1967

299

Ronald D. Hill, Chief
Mine Drainage Pollution Control Activities
4676 Columbia Parkway
Cincinnati, Ohio 45226

Monongahela River Mine Drainage Remedial Project

Upper West Fork River Sub-basin

West Virginia

FEASIBILITY STUDY ON THE APPLICATION OF VARIOUS GROUTING AGENTS, TECHNIQUES AND METHODS TO THE ABATEMENT OF MINE DRAINAGE POLLUTION

PART II

SELECTION AND RECOMMENDATION OF TWENTY MINE SITES

Prepared for the

U. S. DEPARTMENT OF THE INTERIOR

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

By

HALLIBURTON COMPANY
DUNCAN, OKLAHOMA

August 23, 1967

The research upon which this publication is based was performed pursuant to Contract No. 14-12-31, with the Federal Water Pollution Control Administration, Department of the Interior.

1

Halliburton COMPANY

DUNCAN, OKLAHOMA 73533

August 23, 1967

Mr. John R. Hyland, Project Officer
Monongahela River Mine Drainage Remedial Project
401 Methodist Building
11th & Chapline Streets
Wheeling, West Virginia 26003

RE: Feasibility Study on the Application of Various Grouting Techniques and Methods to the Abatement of Mine Drainage Pollution

Dear Sir:

In accordance with the terms of the Department of the Interior, Federal Water Pollution Control Administration Contract No. 14-12-31, we submit herewith Part II Report for the subject feasibility study.

The Report presents the studies, investigations, conclusions and recommendations for selecting twenty (20) drift mine sites in the Upper West Fork River Sub-basin for further study and consideration in remedial methods application and a description of field trials undertaken at Mine Site No. 14-042A in the Sub-basin utilizing one of the proposed methods of plugging or sealing abandoned drift mine openings, a major source of mine drainage pollution in the area.

We appreciate the cooperation that has been afforded us, both by your staff and by others of the Federal Water Pollution Control Administration and the U. S. Department of the Interior.

Sincerely yours,

HALLIBURTON COMPANY

by Alan A. Baker

Alan A. Baker
Project Manager

2

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REPORT IN BRIEF

The Report summarizes the studies and investigations necessary to and the designation of twenty drift mine sites in the Upper West Fork River Sub-basin for which remedial mine drainage pollution abatement methods previously developed in the Contract should be applied.

Essentially, the Report is an interim one, since no immediate action or program is envisioned, whereby the methods application will be applied to all of the twenty sites. However, the twenty sites, which are distributed throughout the Sub-basin, do form the basis for the further selection of a minimum of three sites for which remedial methods design and construction plans, specifications and estimates are to be subsequently prepared under this same Contract.

Reference should be made to the earlier Part I Report in which the drift mine survey, exploration and inventory phases of the Study and remedial methods design and materials investigations are set forth.

In addition to the above, this Report also sets forth the selection of one ✓ of several proposed remedial methods developed in the initial or Part I phase and a site for field testing this method, its application and subsequent performance. A mine seal or plug has been successfully installed in an abandoned drift mine opening, Mine No. 14-042A, which was discharging highly polluted water in the immediate vicinity of Clarksburg, West Virginia. The mine site which was selected for the field trial has also been included in the list of twenty sites considered herein for Remedial Method Application.

CONSULTANTS

In the development and accomplishment of the studies and investigation requisite to the preparation of this Report, several Consultant and Consulting Engineering firms furnished services, as follows:

> J. E. Greiner Company, Consulting Engineers, of Baltimore, Maryland, for furnishing geologists and hydrologists for mine site surveys and inventory, technical writing and report text preparation.
>
> Mr. Paul W. Hornor, Consulting Mining Engineer, Hornor Brothers Engineers of Clarksburg, West Virginia, for mine site reconnaissance and inspections, research, mine map and property searches, site mapping and general consultation.
>
> Dr. A. V. Pegler, Consulting Mining Engineer, of Queen's University, Kingston, Ontario, for rock mechanics investigation and analyses, and design.
>
> Mr. Willard E White, Consulting Grouting Engineer, White and Cates Engineering Company of Marion, Ohio, for general consultation, resident management, mine site reconnaissance and grouting techniques, and remedial methods design and evaluation.
>
> In addition to the above, valuable assistance was rendered by Mr. Henry Gay, Superintendent, Clarksburg Water Board, Clarksburg, West Virginia.

Also, several manufacturers and contractors have furnished valuable data and estimates of materials and equipment necessary to the progress of the Work.

PROJECT PROGRAM

SYNOPSIS - PART I REPORT

The Study, of which this Report represents the second phase or part initially involved a survey of all drift mine openings in the Upper West Fork River Sub-basin and the development of alternate remedial methods for the abatement of mine drainage pollution. The methods which were developed and have been set forth in the Part I Report essentially involved the application of grouting techniques to this wide-spread pollution problem.

The Sub-basin forms a part of the much larger Monongahela River Basin as shown on PLATE I. PLATE II delineates the Upper West Fork Sub-basin in its entirety and shows the various mine sites which have been surveyed during the course of this project. In addition, the mines which have been selected herein to comprise the twenty sites are shown thereon in red.

Essentially, then, this Report represents the further study, analyses, and extension of the program begun in the Part I Report and now set forth in accordance with the requirements of the Contract. From a total of two hundred and twenty-eight sites some sixty sites were initially designated as requiring remedial action. From these, twenty sites, as set forth herein, have been recommended for further study within the scope of this Study.

Still
studying?
Good Lord!

SELECTION OF TWENTY SITES

Twenty mine sites have been selected from the two hundred twenty-eight mines surveyed in the initial phase or Part I of the Contract for further study to determine a minimum of three sites to be specified later under Part III for application to include as a minimum the following methods:

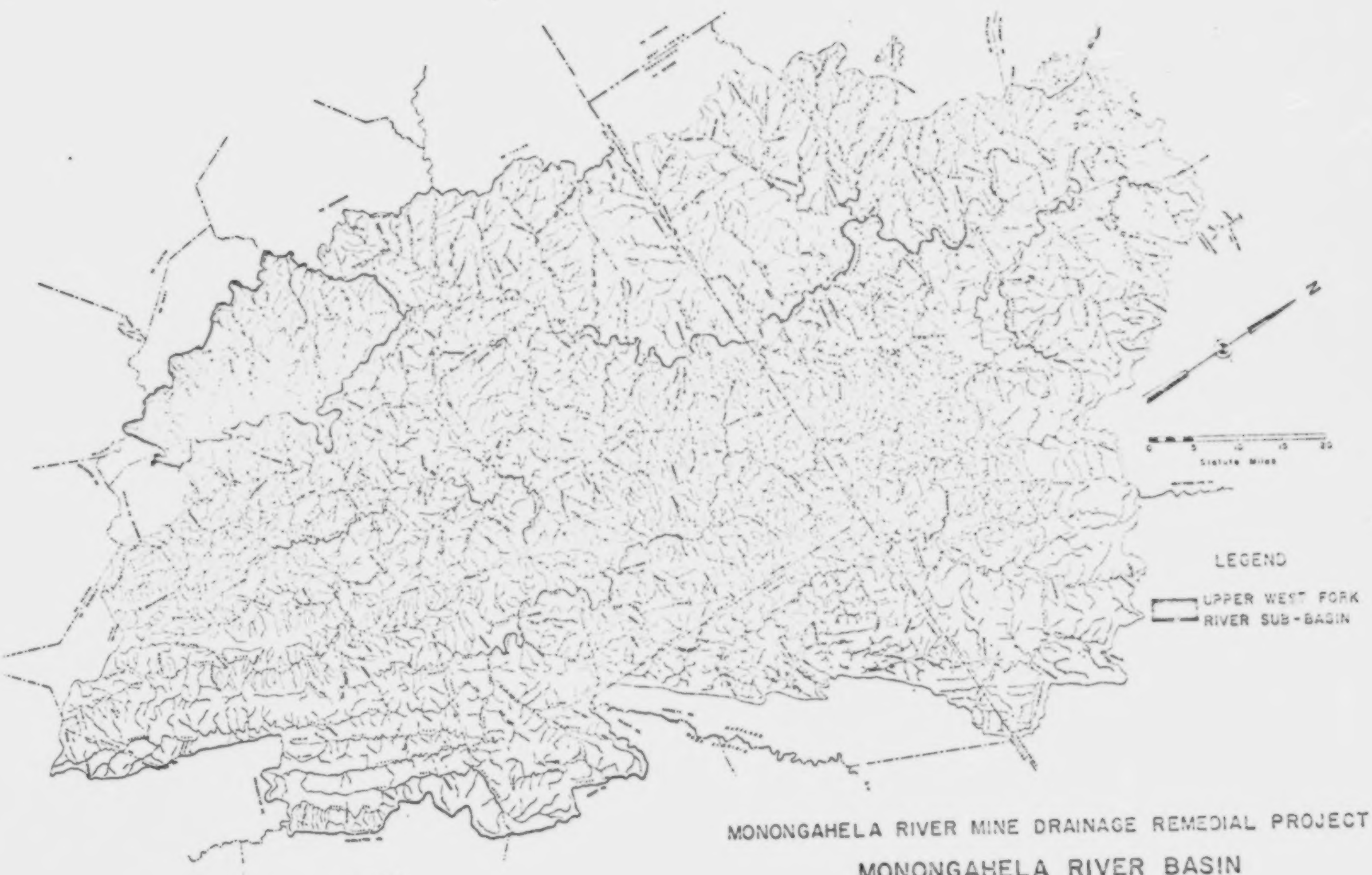
Curtain type application to exclude ground-water from the mined area,

Mine sealing by remote placement, and

Creation of ground conditions suitable for grouting application.

These twenty sites, which are being recommended and are described in detail herein, were selected with the concurrence of the F. W. P. C. A. Project Officer following review of the earlier and extensive Monongahela River Remedial Mine Drainage Project. Survey data, analyses and reports, and subsequent field surveys were conducted under this Study utilizing the several consultants to the Contract. Care was exercised in this Study to select those mine sites which would exhibit physical characteristics consistent with and typical of conditions existing throughout the Upper West Fork River Sub-basin and for the application of remedial methods which have been developed under this Contract.

These methods include remotely placing plugs at or in direct proximity to mine openings, filling mine openings with waste or other material and subsequent grouting or consolidation of the material to form a plug or seal, remotely erecting temporary and/or permanent bulkheads or plugs at interior haulways to isolate interconnected mine complexes, reducing water entry by plugging and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Statute Miles
LEGEND
UPPER WEST FORK RIVER SUB-BASIN

XXXXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
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MONONGAHELA RIVER MINE DRAINAGE REMEDIAL PROJECT

MONONGAHELA RIVER BASIN

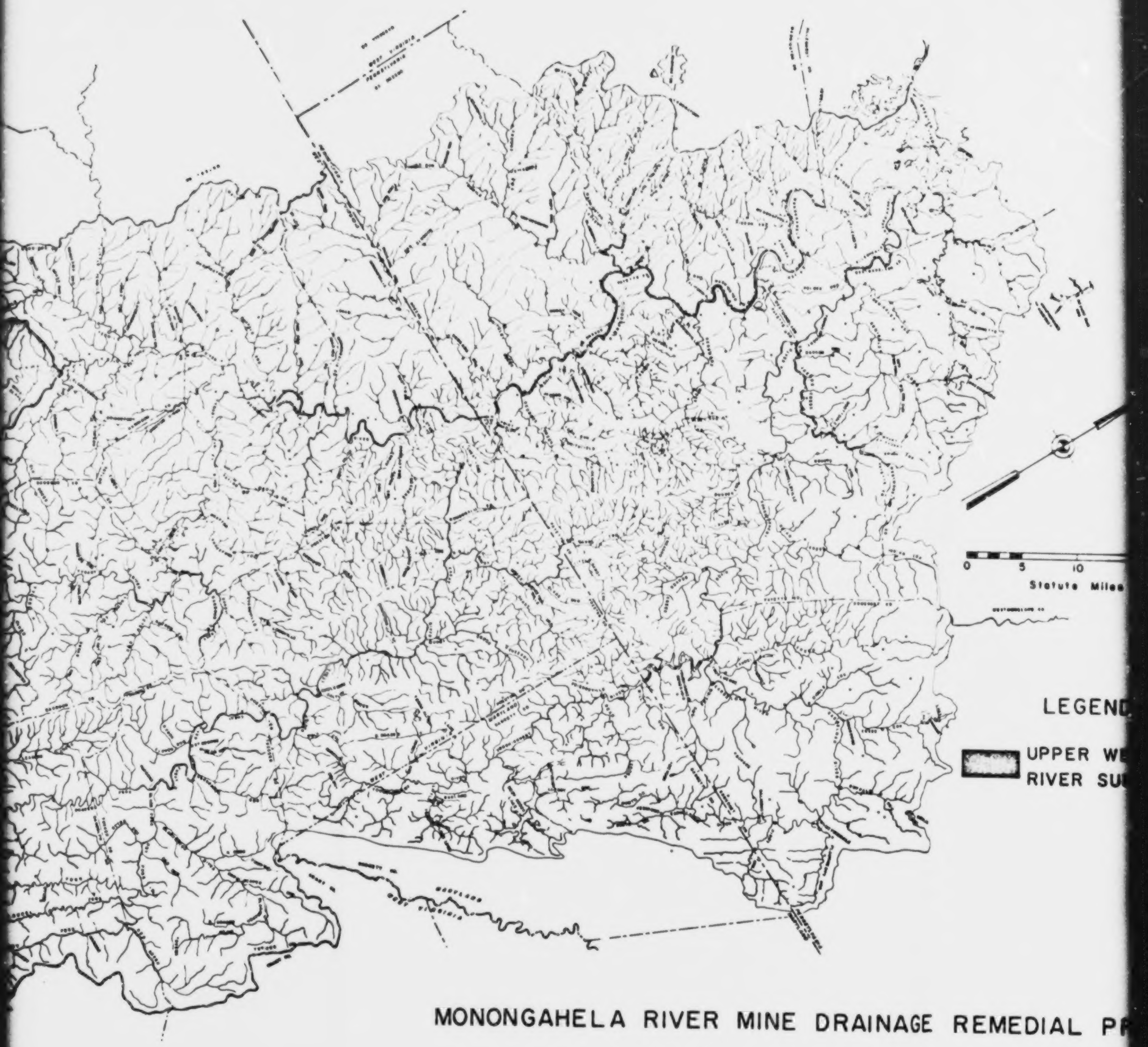
U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL AGENCY
Ohio Basin Region Cincinnati, Ohio

10-a

PLATE I

WEST VIRGINIA
PENNSYLVANIA

A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RIVER SU

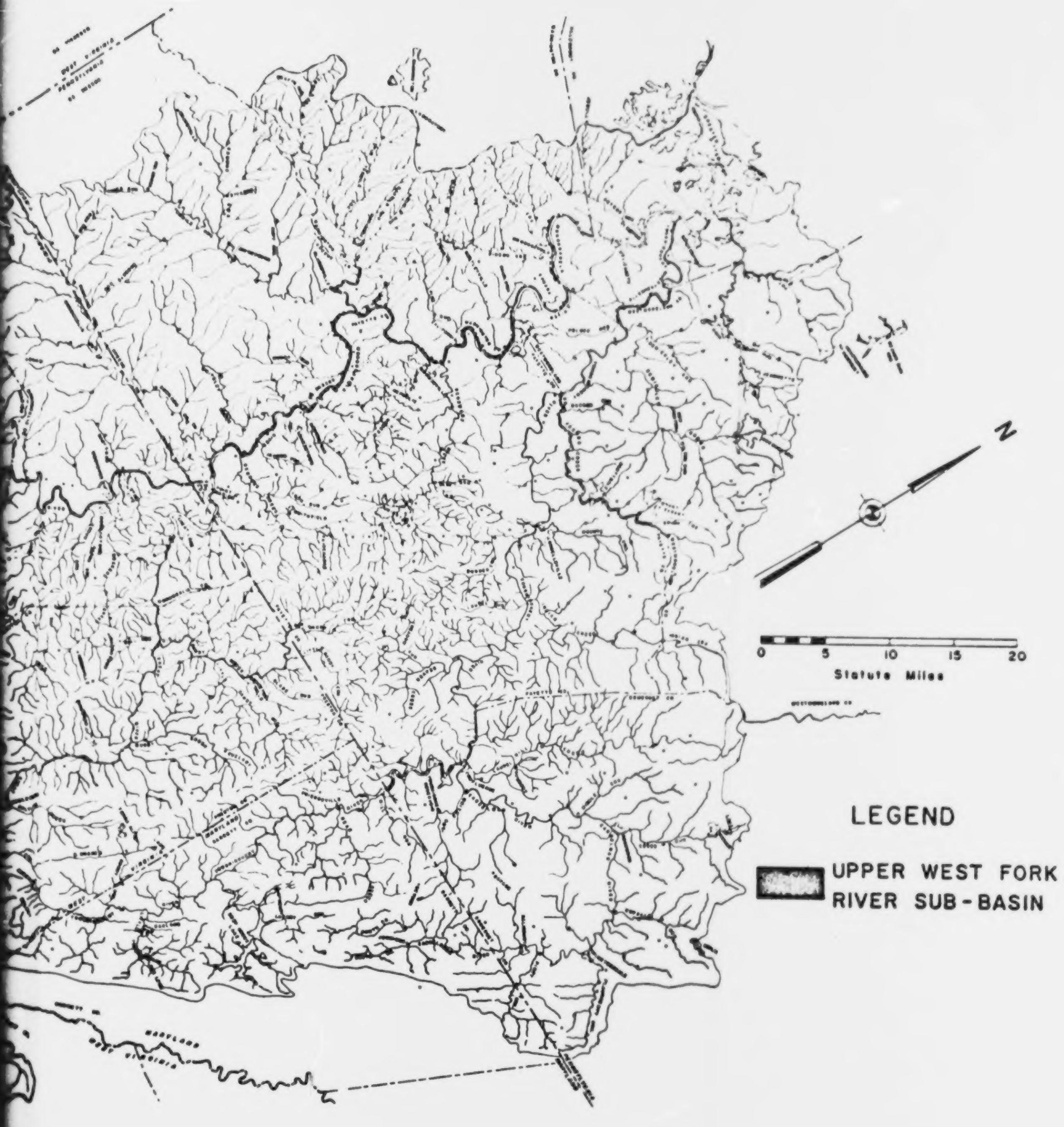
MONONGAHELA RIVER MINE DRAINAGE REMEDIAL PR

MONONGAHELA RIVER BASIN

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL AGENCY
Ohio Basin Region Cincinnati, Ohio

B

10-a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Statute Miles
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▨ UPPER WEST FORK RIVER SUB-BASIN

MONONGAHELA RIVER MINE DRAINAGE REMEDIAL PROJECT

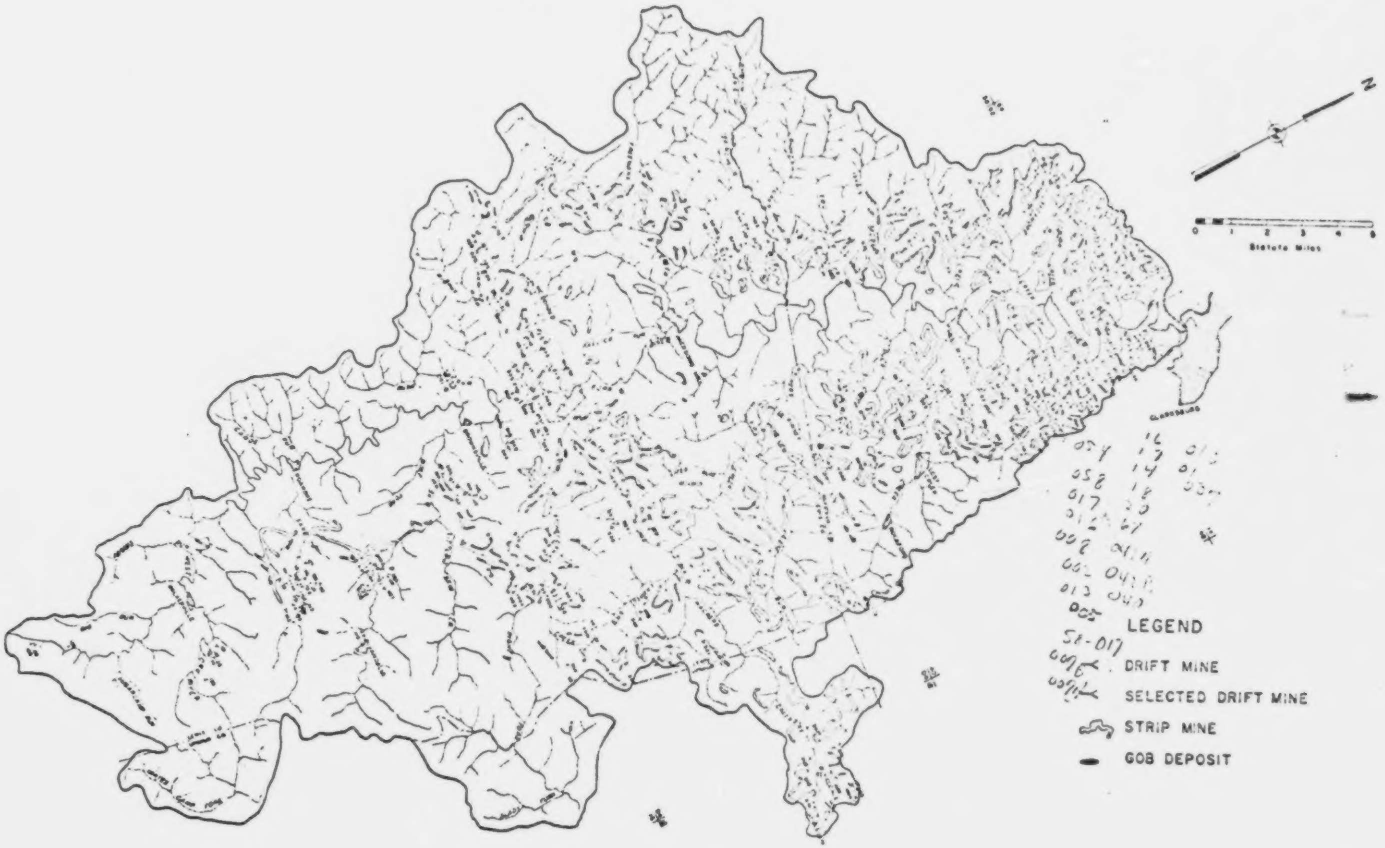
MONONGAHELA RIVER BASIN

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL AGENCY
Ohio Basin Region Cincinnati, Ohio

B

10-a

PLATE IC


N
0 1 2 3 4 5
Statute Miles
Clarksburg
054 16 013
058 14 01
017 18 034
012 20
008 21 041
002 041
013 040
005
SR-017
LEGEND
DRIFT MINE
SELECTED DRIFT MINE
STRIP MINE
GOB DEPOSIT

:XXXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
:XXXXXXXXXXXXXXXXXXXXXXXXXX

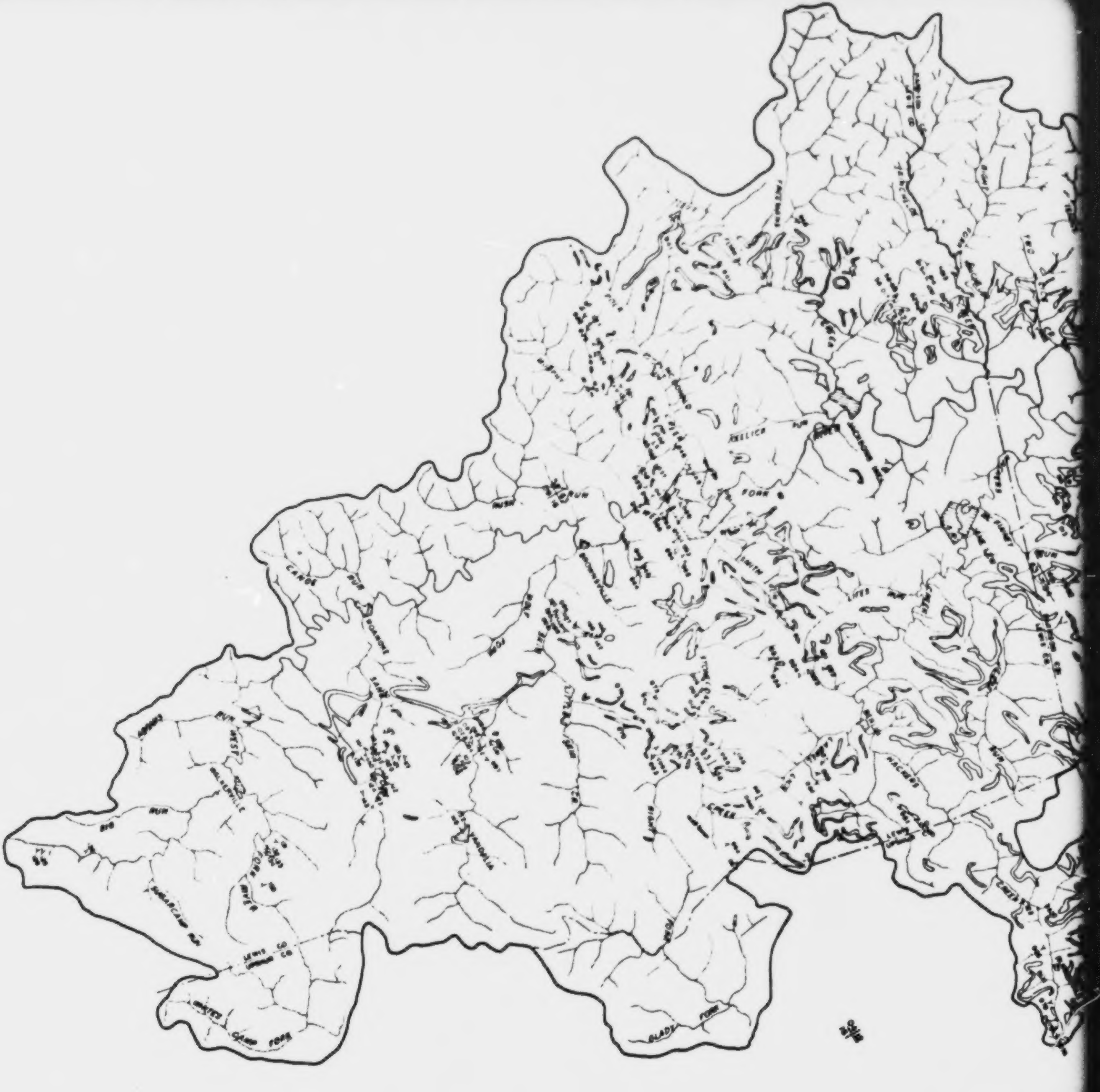
MONONGAHELA RIVER MINE DRAINAGE REMEDIAL PROJECT

UPPER WEST FORK RIVER SUB-BASIN
SELECTED MINE LOCATIONS

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL AGENCY
Ohio Basin Region Cincinnati, Ohio

10-b

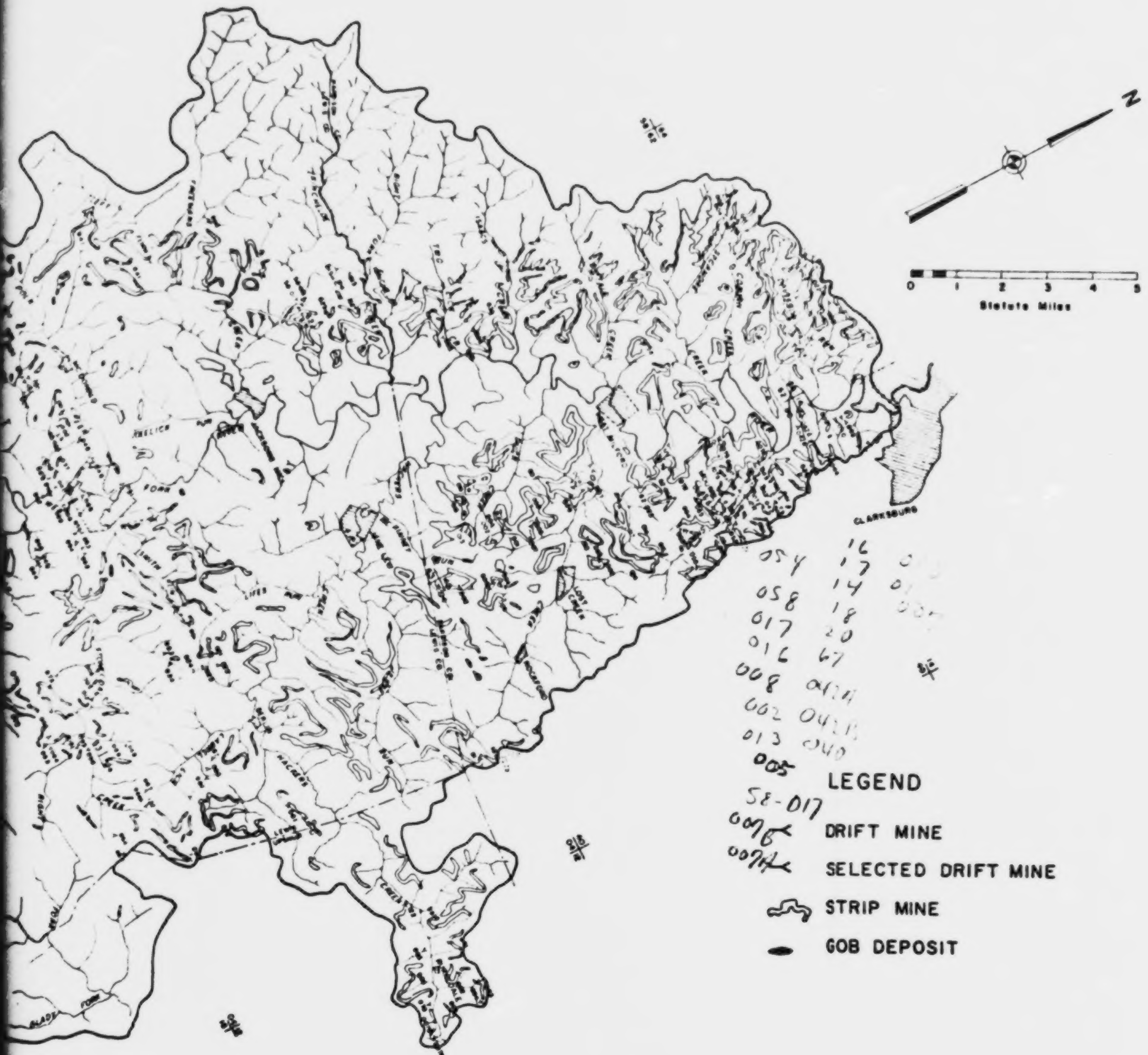
PLATE II


BIG RUN
WEST FORK RIVER
WALKERSVILLE
LEWIS CO.
UPSHUR CO.
CAMP FORK
GLADY FORK

MONONGAHE

UPP

H


N
0 1 2 3 4 5
Statute Miles
CLARKSBURG
LEGEND
DRIFT MINE
SELECTED DRIFT MINE
STRIP MINE
GOB DEPOSIT

054 16
058 17
017 14
016 18
008 20
002 67
013 042A
005 042B
040
58-017
007B
007A

MONONGAHELA RIVER MINE DRAINAGE REMEDIAL PROJECT

UPPER WEST FORK RIVER SUB-BASIN
SELECTED MINE LOCATIONS

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL AGENCY
Ohio Basin Region Cincinnati, Ohio

10-6

B PLATE II

sealing exposed auger holes and subsidence areas which trap or permit water entry to the mine from the surface or highwall, and filling mine voids with basic material or other acid forming inhibitors. In addition to the above, surface grouting and sealing would be undertaken in association with mine openings, highwalls, fractures, subsidence areas to further seal weakened areas or small leaks and to adequately maintain the condition and appearance of the work.

Maps of drift mine workings were searched and utilized when located. However, it should be noted these are often unavailable. The time which has elapsed since many of these sites were deep mined and subsequently abandoned have caused many of the maps to be lost, destroyed or at best outdated. It is felt this condition will be typical for most abandoned mines throughout the Appalachian area. In order to adequately apply many of the remedial methods which have been developed to date in the current Feasibility Study, additional data and mapping of mined areas, voids, haulways, cross cuts, pillars, falls and faults must be acquired or the subsurface condition leading to the production of highly polluted mine discharges ascertained. Therefore, field trials should be conducted testing various geophysical survey methods, possibly as separate or allied projects, to determine the feasibility of these methods in accurately locating underground mine workings, subsurface subsidence areas, thin highwall sections, et cetera, prior to any intensive program in the application of the several remedial methods as set forth in the description of the recommended twenty sites.

Tables A and B which are included in the Appendix, list the mine sites which have been previously surveyed as part of the Contract and comprise the drift mine inventory for the Sub-basin. Table A shows the measured mine flows and water sample quality analyses for those mines which have been surveyed. Table B lists, in addition to the flows, the type of mine, the coal seam worked, and the status and type of remedial action required. These tables have been reproduced from the Part I Report and represent the status at the end of that phase of the Contract.

Table C is also included in the Appendix and tabulates the mineral loads of the observed and measured drainage for the selected mine sites.

Following each description of the twenty sites, a mine site data summary sheet, aerial photography of the site, coal mine map and geologic section over the mine is included in that order. Individual mine inventory sheets for the several surveys and resurveys completed as part of this Study are included for further reference in the Appendix following Table C.

Mine No. 12-007A

Hacker's Creek Mine No. 1

This Redstone drift mine is located within Redstone Strip Mine No. 12-007 which drains directly into the headwaters of Hacker's Creek near Hodgeville, Upshur County, W. Va. Mine opening coordinates are 39° 03.7' N and 80° 12.5' W. Coal rights are owned by John K. Shaw, Jr. of Towson, Md. The coal dips slowly at N 35° W. This mine property connects to solid unmined coal to the north and belongs to Peck's Run Coal Co. Also, during underground surveying while actively mining in Mine No. 12-007A, old workings were encountered which connect this property to the mined and abandoned Wilson Coal Company to the east. Drainage of the Wilson Coal property may be parallel to the coal contours and/or to the opening of Mine No. 12-007A. A portion of Mine No. 12-007A is believed to drain into Mine No. 12-007B through three tunnels. Flow from this mine was originally of low pH but has been determined to be higher in subsequent sampling. The pH values may become lower at some future date.

The solid coal on the Peck's Run property has been recently leased to Lafayette Corporation of Clarksburg, Don Herold, owner, for stripping, augering, and deep mining. This should not interfere with remedial measures suggested for Mine No. 12-007A.

Available mapping indicates the majority of Redstone coal in Mine No. 12-007A has been deep mined and no further entry is anticipated. Possible future stripping on the south or high side of the coal could expose points of entry for water. This would drain primarily to the northwest opening indicated on the maps as the major exit of mine water. However, at least three main pitmouths exist in the north central area which show evidences of subsidence.

Diversion of water from Mine No. 12-007A to and through the Wilson mine would change the receiving stream from Hacker's Creek to the Buckhannon River, through Peck's Run, which would be out of the Study Area.

During a survey with the Project Officer and the Mining Consultant manual enlargement of the drainway increased the flow from a seep to 60 gpm. Subsequent measurements found this flow to remain at 60 gpm. until May 22, 1967 when the measurement increased to 84 gpm. Laboratory analyses indicated high mineralization and fairly high pH.

Remedial measures would include plugging of the major drainage as well as the three or more former pitmouths. Application of grout curtain methods and creation of conditions to permit subsequent grouting could also be employed. Diversion of the drainage to Mine No. 12-007B may be prevented by plugging the three tunnels to that mine. Subsequent excavation of a portion of the tunnel plugs may permit visual inspection of the drainage characteristics for only 10 feet to 15 feet of cover exists over the tunnel roof.

An estimate of available gob near the mine is in excess of 1,000,000 cu. ft. It is suggested that this gob be incorporated in the pitmouth sealing material if found to be economically feasible. The gob not utilized in this operation could be disposed of into the mine.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 12-007 A

County Upshur Township Warren State W. Va.

Coordinates 39° 3.7' N 80° 12.5' W Map Reference Philippi 7-1/2'

Receiving Stream Headwaters of Hacker's Creek

Mine Name Hacker's Creek Mine No. 1

Company Name Hacker's Creek Coal Company John K. Shaw Jr. - Owner

Surface Owner John K. Shaw Jr.

Coal Designation Redstone

Elevation 1390 - 1415

Area Mined 149 Acres

Reserves 43 Acres (unmined 9 - unstripped 34)

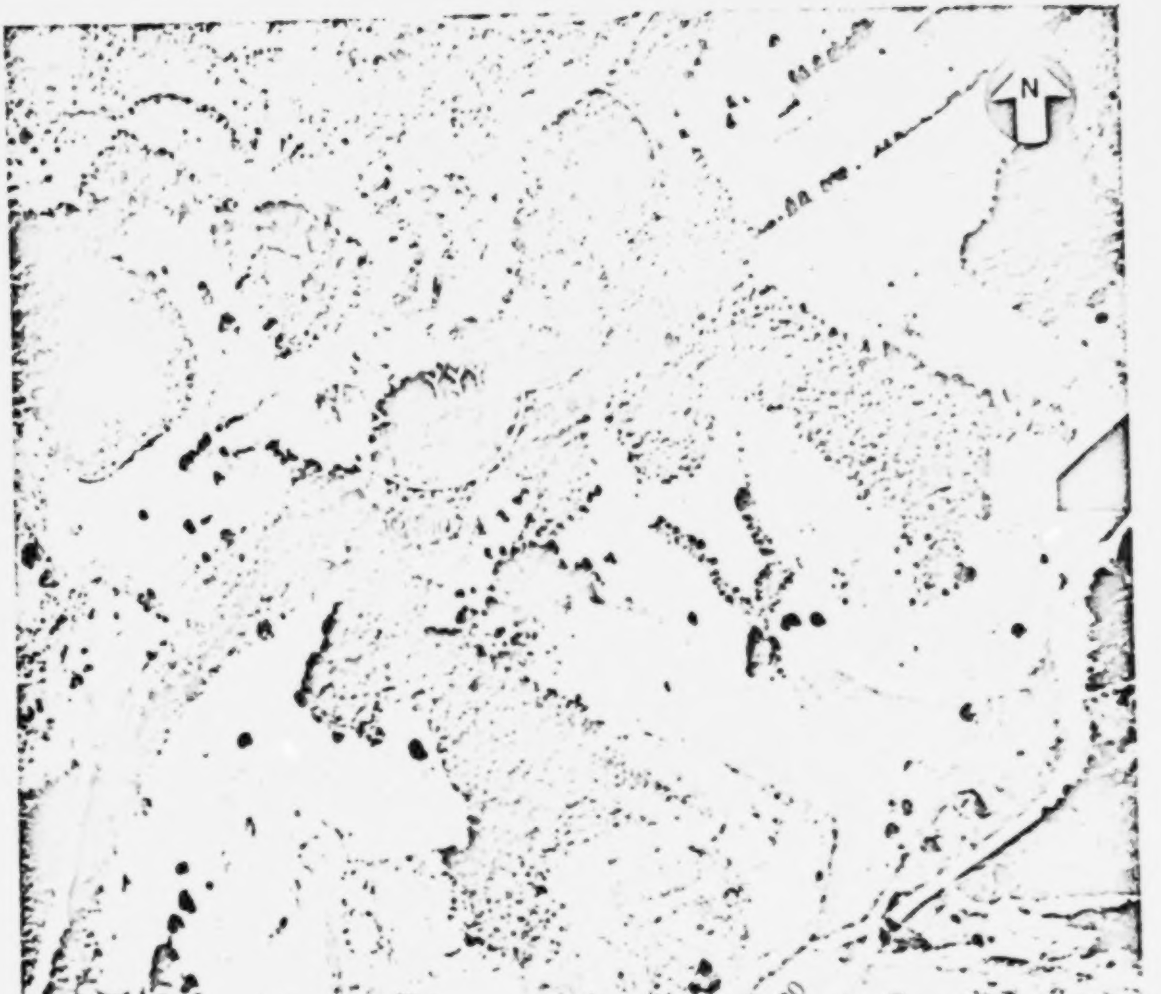
Mining Method Drift and partial strip

Maximum Overburden 280'

Coal Dip Slowly North 35° West

Notes

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/1	#/day			mg/1	#/day			
8-31-65	2 gpm	3.0	243	9	93	1070	9.1	1.0	1445	13.3	1500
1-17-67	10 "	6.1	0	0	320	680	6.0	0.7	1105	6.0	2600
1-31-67	13 "	6.9	0	0	324	570	8	1.2	1130	1	
2-15-67	60 "	6.3	10	7.2	338	440	4.0	2.9	845	2	2160
3- 1-67	60 "	6.3	0	0	234	700	4.8	3.4	1040	0	2364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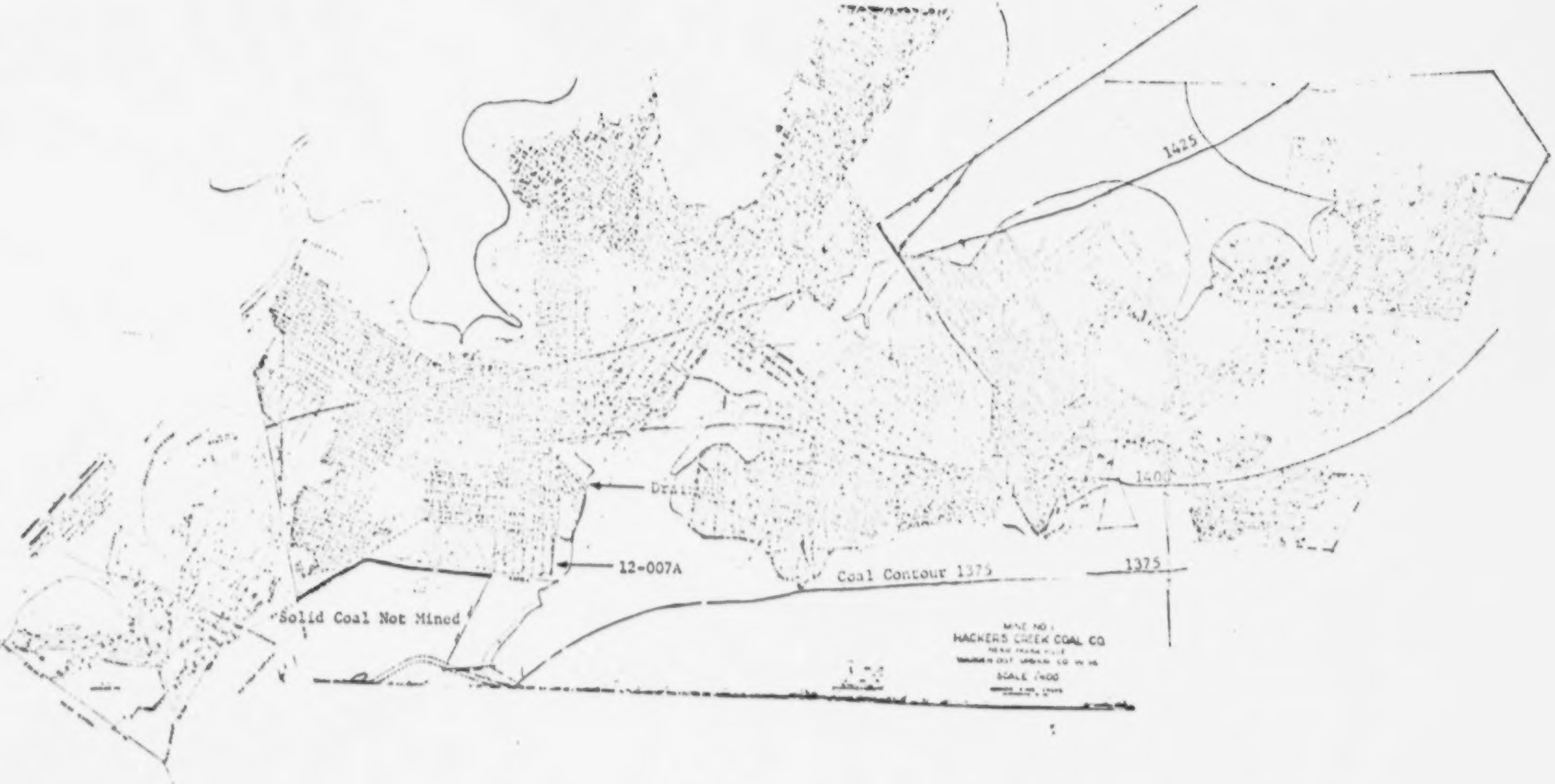
best available copy.


1425
1400
1375
Coal Contour 1375
Dra
12-007A
Solid Coal Not Mined
MINE NO 1
HACKERS CREEK COAL CO
SCALE 1400

MINE MAP for MINE NO. 12-007A

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See the following pages
for greater detail.
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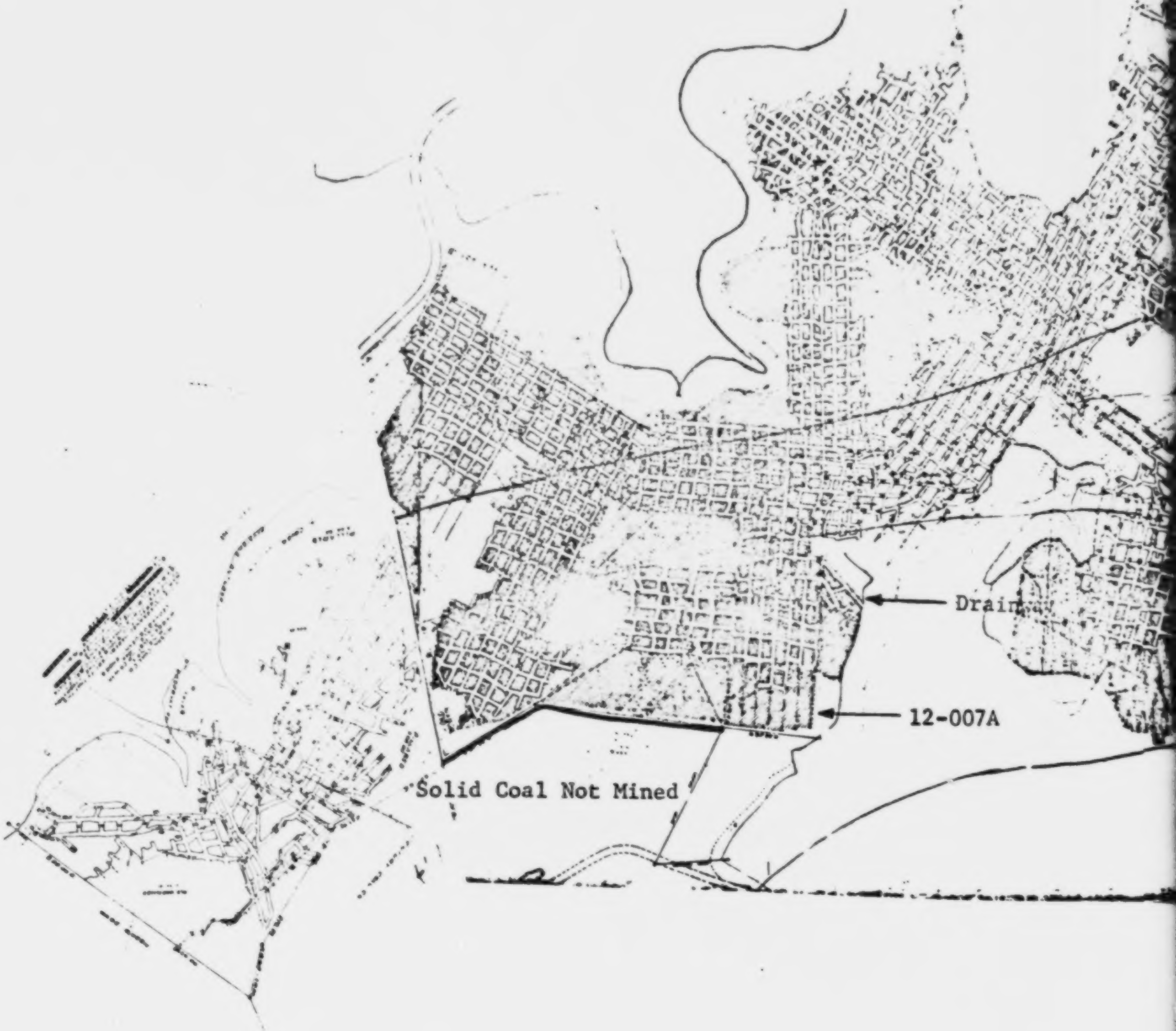
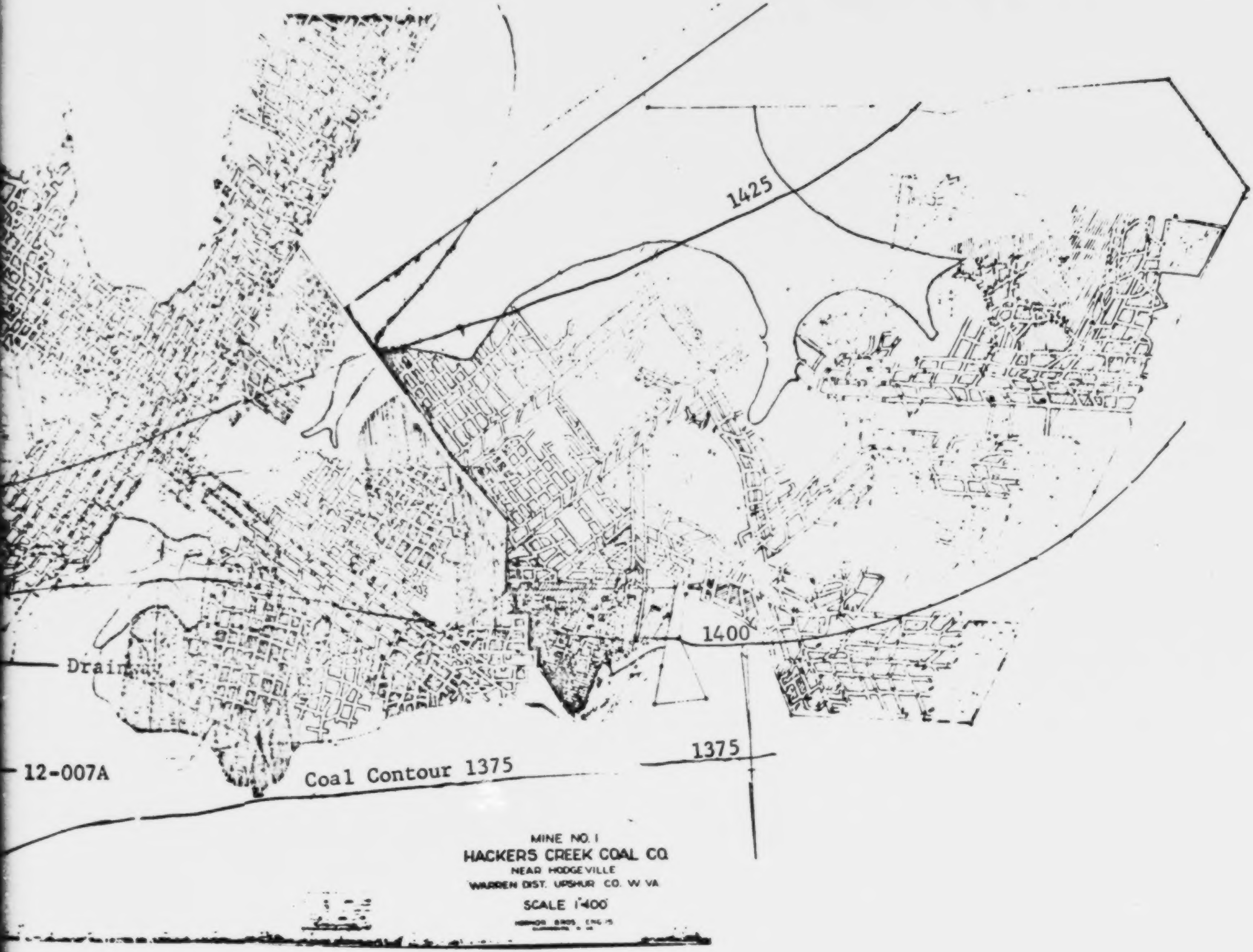
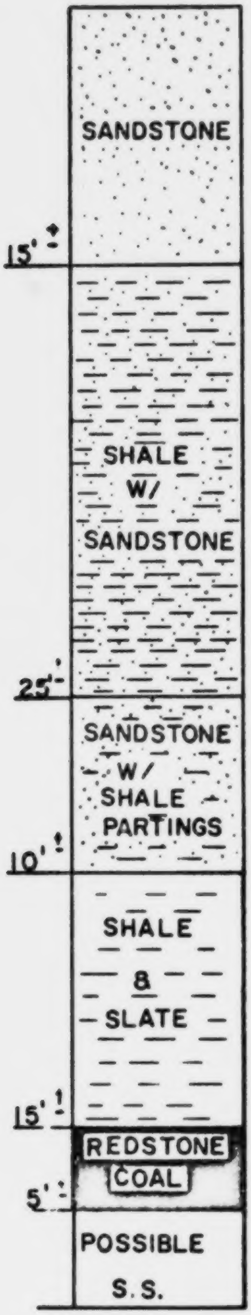

Drain
12-007A
Solid Coal Not Mined

A

MINE MAP for MINE NO. 12-007A


1425
1400
Drai
12-007A
Coal Contour 1375
1375
MINE NO. 1
HACKERS CREEK COAL CO.
NEAR HODGEVILLE
WARREN DIST. UPSHUR CO. W VA
SCALE 1"=400'

B


SANDSTONE
15'±
SHALE W/ SANDSTONE
25'±
SANDSTONE W/ SHALE PARTINGS
10'±
SHALE & SLATE
15'±
REDSTONE COAL
5'±
POSSIBLE S.S.

GEOLOGIC SECTION

MINE NO.
12-007A

Mine No. 12-007B

Hacker's Creek Mine No. 3

This mine opening (drainway) lies to the west of Mine No. 12-007A and is situated in abandoned workings of the Hacker's Creek Mine No. 1. The opening discharges mine drainage to the headwaters of Hacker's Creek. The extensive drifts in this area have been pillared on the periphery of the coal frontage and the northern frontage has been stripped. No further drift mining is anticipated. This section of the Hacker's Creek Mine is separated from the portion covered under Mine No. 12-007A by a narrow neck of coal covered with 10 to 15 feet of overburden. Three haulways connect the two sections through this neck suggesting the possible separation of adjoining Mine No. 12-007A.

Fire swept the workings associated with this opening and was successfully extinguished by sealing the haulways and drainways. Following this fire, the mine was reopened and worked for a short time. This drift mine complex also interconnects at the west with the Redstone Mine No. 3. Since the coal slowly dips to the northwest, some drainage from the latter mine may be involved. Similarly, plugging or sealing openings on the north face may cause impoundments of water within the mine, thereby causing reverse flooding of the Redstone Mine No. 3. Original entry to this mine was via haulways situated on the southwest and beyond the Upper West Fork River Sub-basin limits. A drainway from the Redstone mine has been noted farther east on the northwest face. Plugging of Mine No. 12-007A may later cause increased flow at this location.

Remedial measures would involve plugging the observed opening (possibly the Redstone mine drainway noted above), sealing and/or plugging the haulways connecting Mines No. 12-007A and B. Presence of gob in the area could permit its disposal or possible utilization as an additive with cementitious material for plugs. Concealed openings, as mentioned, were observed which would permit attempted sealing of mine openings by remote methods at areas covered by strip mining backfill.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 12-007 B

County Upshur Township Warren State W. Va.

Coordinates 39° 03.7' N 80° 13' W Map Reference Phillippi 7 1/2'

Receiving Stream Headwaters of Hacker's Creek

Mine Name Hacker's Creek Mine N0. 3

Company Name Hacker's Creek Coal Company John K. Shaw Jr. - Owner

Surface Owner John K. Shaw Jr.

Coal Designation Redstone

Elevation 1390' - 1415'

Area Mined 36 Acres

Reserves 11 Acres (unmined 10, unstripped 1)

Mining Method Drift and partial strip on north face

Maximum Overburden 300'

Coal Dip Slow North 25° West.

Notes

Date	Flow type ground	pH	Acid mg/l	Acid #/day	Alka	Hard	Iron mg/l	Iron #/day	SO4	Al	Cond.
3-29-67	25 gpm	6.7	0	0	171	480	0	0	468	4.8	1220

Note - Originally sampled as a part of 12-007 A.

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12-007
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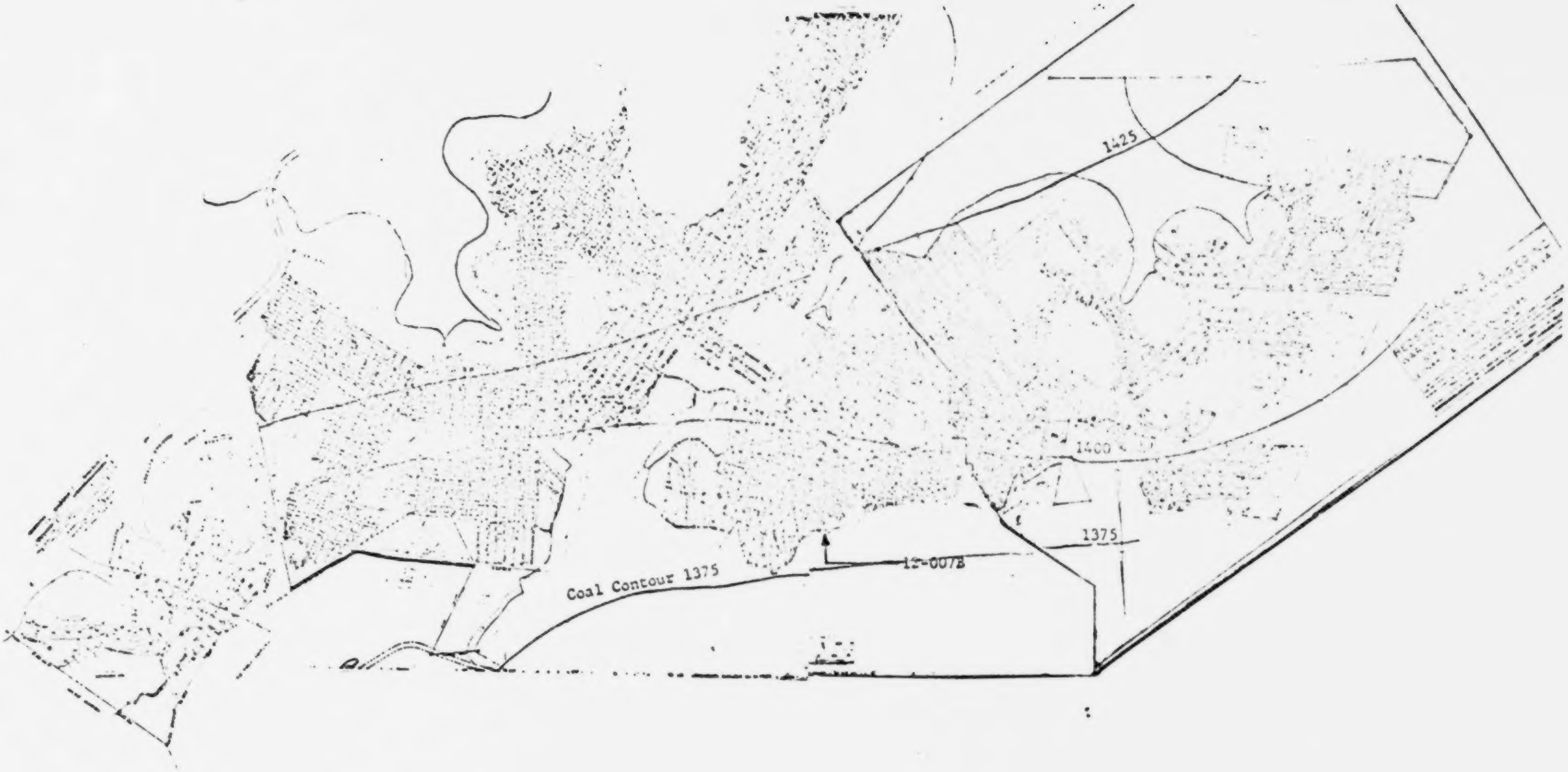
1425
1400
1375
Coal Contour 1375
12-007B

MINE MAP for MINE NO. 12-007B

XXXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
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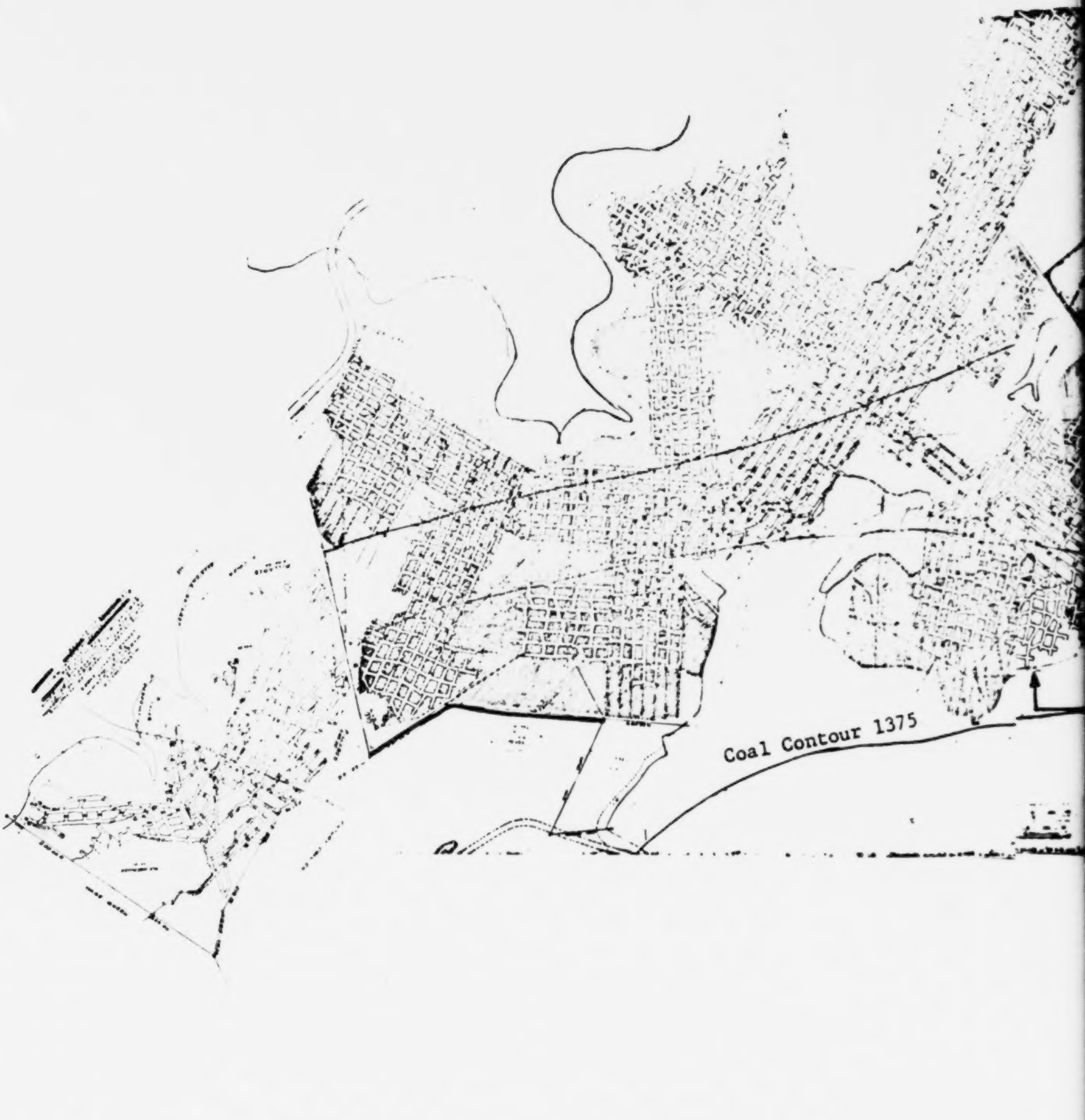
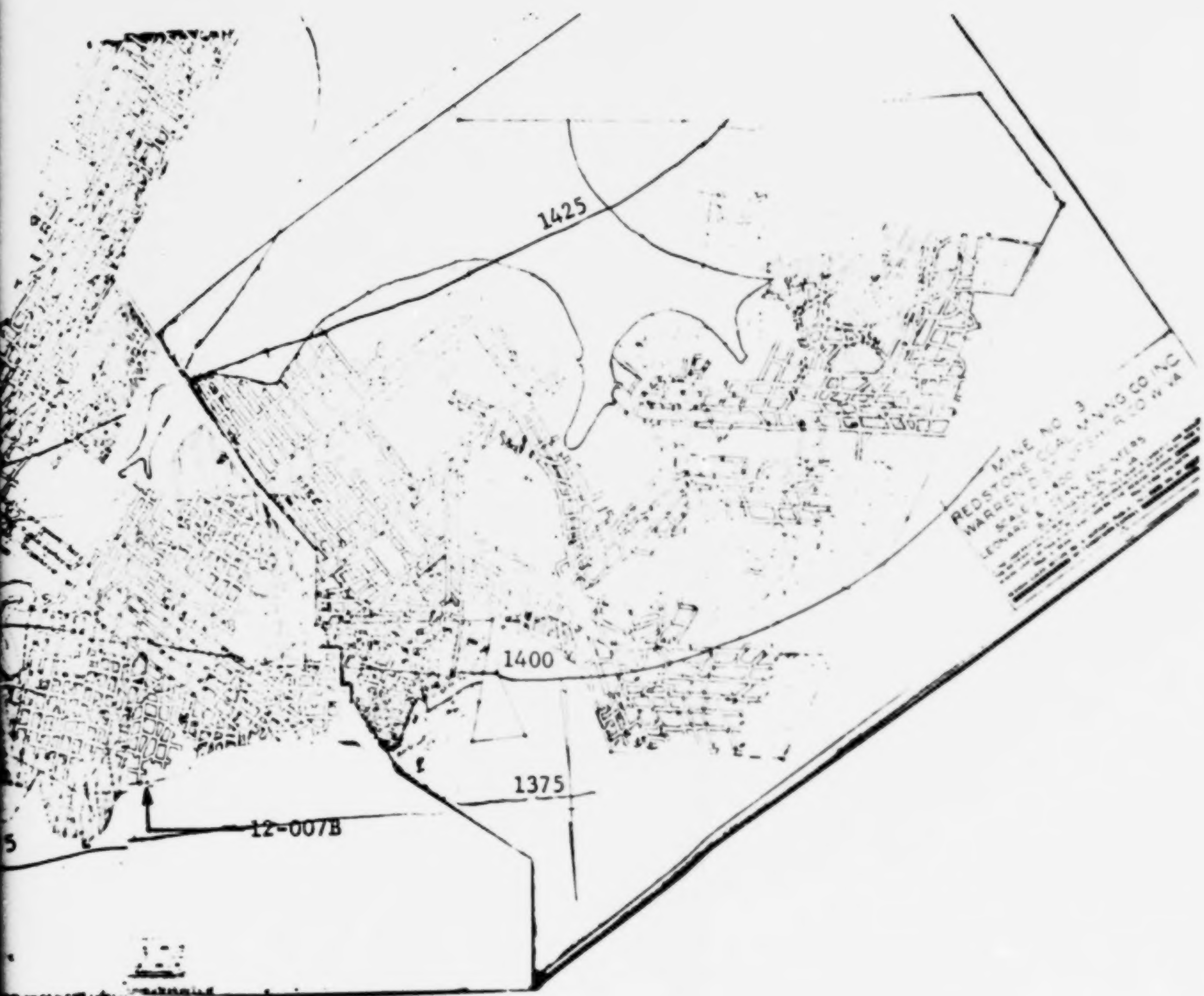
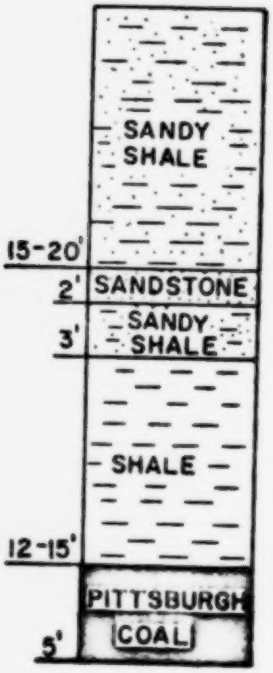

Coal Contour 1375

MINE MAP for MINE NO. 12-007B


1425
1400
1375
12-007B
5
REDSTONE MINE NO. 3
WARREN COAL MINING CO INC
SCALE
LEONARD ENGINEERS


SANDY SHALE
15-20'
2'
SANDSTONE
3'
SANDY SHALE
SHALE
12-15'
PITTSBURGH
COAL
5'

GEOLOGIC SECTION

MINE NO.
12-007B

Mine No. 14-040

Pittsburgh - Consolidation Coal Company Mine No. 31

There is evidence of four openings located along the west face of the coal seam. The mine drainage discharges directly to the West Fork River about one mile south of Clarksburg. The site is immediately east of State Secondary Route 25 and lies along a peninsula trending in a generally north-south direction. Stripping has taken place around the northern extremity of this peninsula. The southern extension of this mine site connects with the Pitcairn Mine complex to the east and north and includes the Consolidation Coal Company lease. An unmined coal area and coal reserve may separate this site from the adjacent Pitcairn Mine operation. The coal dips slowly at S 75°E. An old pitmouth and drainway (Mine No. 14-003) on the east side of the hill is draining, but the flow is outside the Study Area. Plugging of the obscured openings might be attempted by remote methods, or excavation could be performed to reveal these openings for subsequent plugging by means of the use of Expendable Grout Retainers. Access is good to the mined area. Conditions are favorable for plugging of subsidence areas. Curtain type grouting methods could be employed above the 12-foot cover line to attempt to prevent water from entering the mine area.

It should be noted that the observed increase in the mineral content of the mine drainage, the close proximity to populated areas, and the similarity to pollution conditions existing in larger mining complexes are factors in favor of retaining this mine site as one of the twenty sites to be selected under Part II of this Report.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 14-040

County Harrison Township Clark State W. Va.

Coordinates 39° 15.7'N 80° 21.4'W Map Reference Clarksburg 7 1/2'

Receiving Stream West Fork River

Mine Name Consolidation # 31 & Custer & Stout Heirs.

Company Name Consolidation Coal No. 31 & Custer and Stout Heirs

Surface Owner Paul Strather

Coal Designation Pittsburgh

Elevation 1130'

Area Mined 60 acres

Reserves Some reserves - mostly small blocks to drift mine. Fair amount of strip coal.

Mining Method Old drift and partial strip on North and Southwest side.

Maximum Overburden 175'

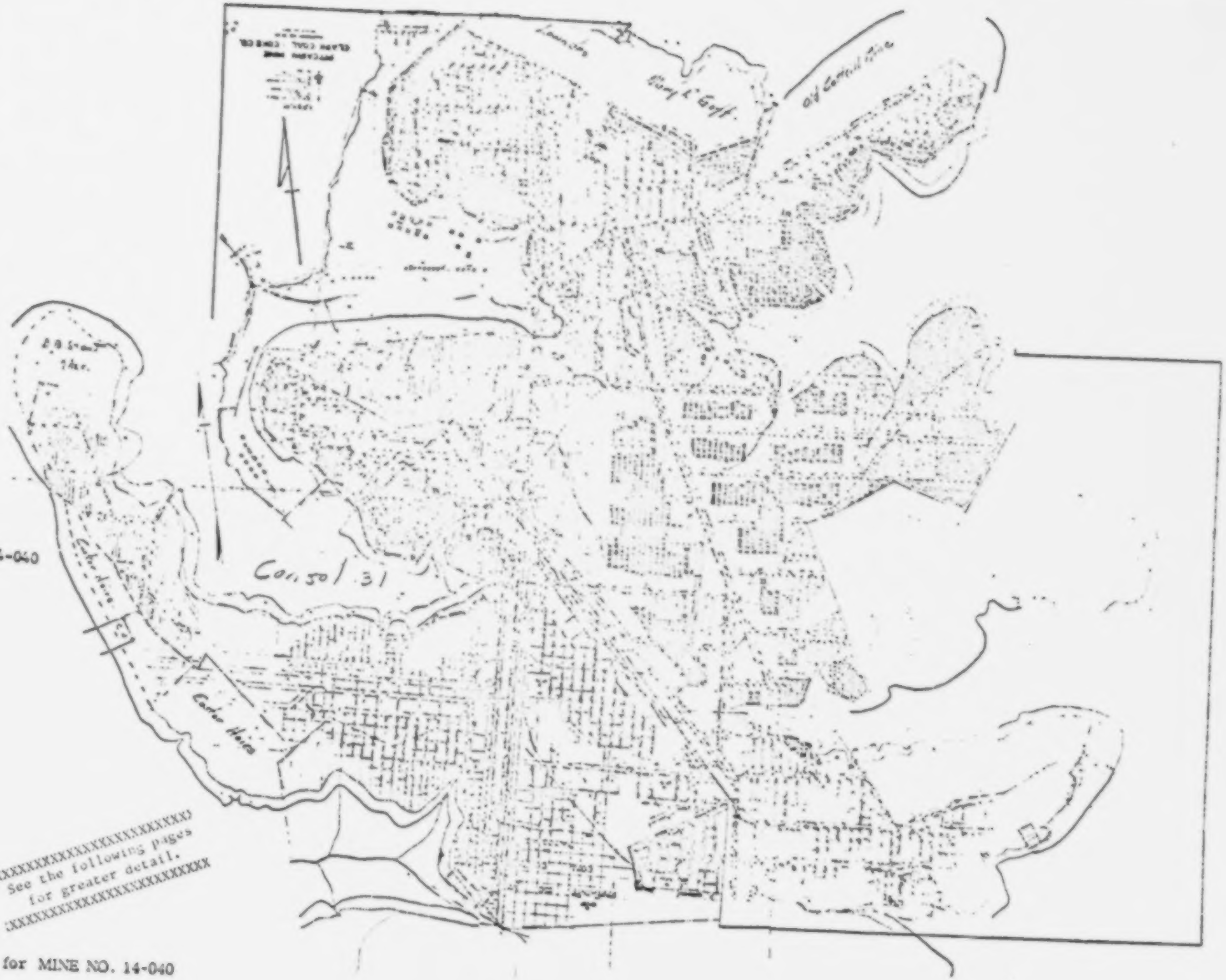
Coal Dip Slow South 75° West

Notes

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
2-22-66	5 gpm	2.7	1730	73	0	1168	389	16	2600	61.6	3640
1-25-67	0.5 "	3.0	970	5.76	0	1330	210	1.2	2236	55.0	3020
3-17-67	20 "	2.8	1750	421.4	0	1320	318	76.5	2912	89	4000
3-17-67	2)12 "	2.4	4620	668.6	0	1200	1200	176.6	6500	355	6760

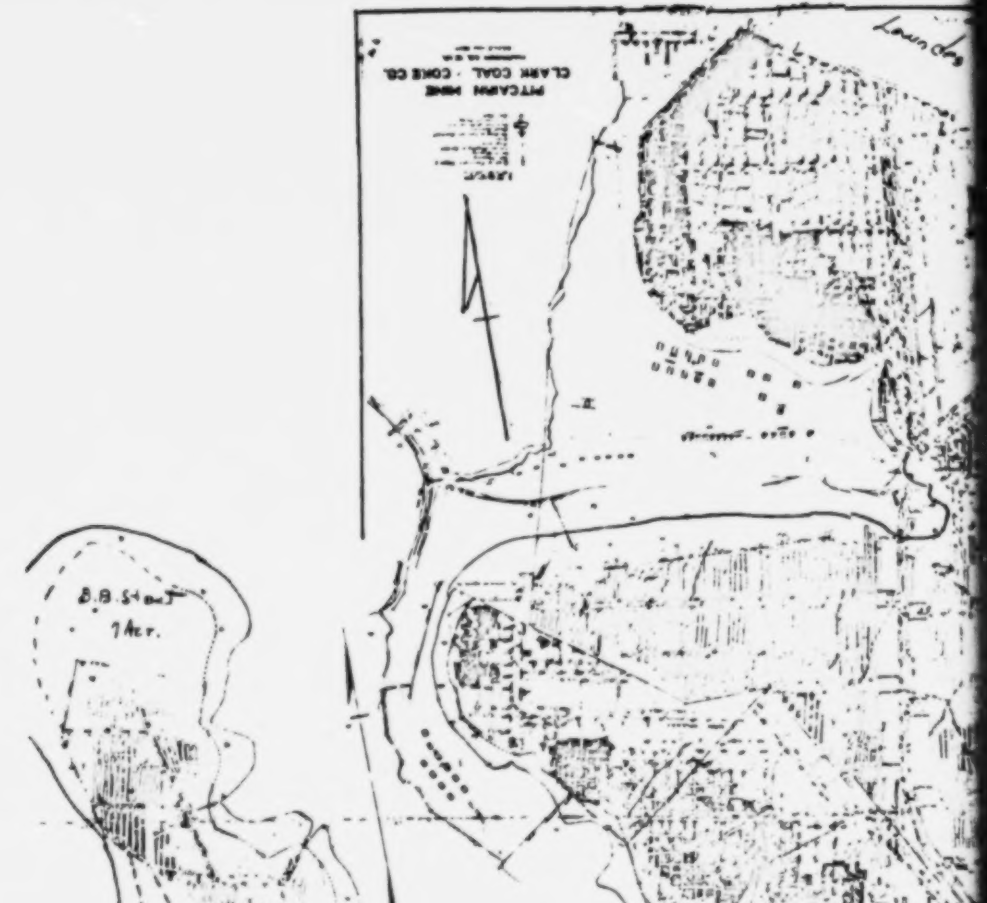
N
11-040

14-040


Consol 31
Carter Heirs
Carter Heirs
Gray & Goff

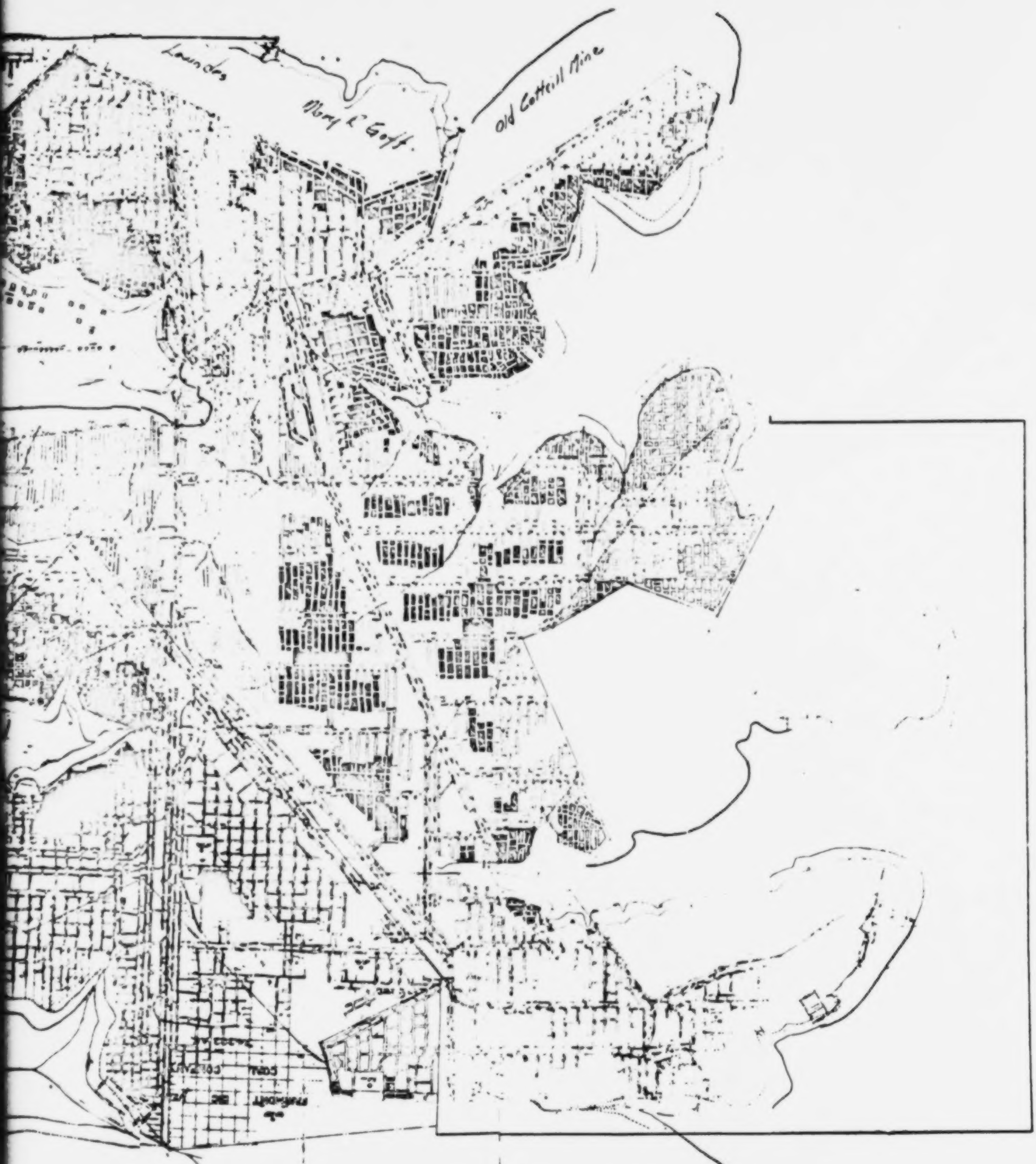
XXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXXX

MINE MAP for MINE NO. 14-040

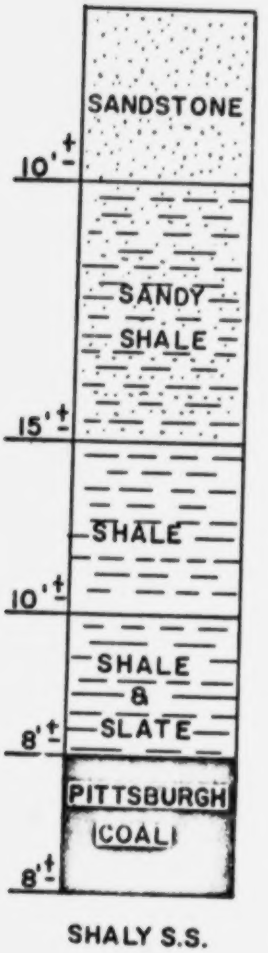

PITCAIRN MINE
CLARK COAL - COKE CO.
B.B. Stuart
7 Acr.
14-040
Carter Heirs
Consol 31
Carter Heirs

A

MINE MAP for MINE NO. 14-040


Lowndes
Mary C Goff.
Old Cottrill Mine

B


SANDSTONE
10'±
SANDY SHALE
15'±
SHALE
10'±
SHALE & SLATE
8'±
PITTSBURGH (COAL)
8'±
SHALY S.S.

GEOLOGIC SECTION

MINE NO.
14-040

Mine No. 14-042A

Penn Coal Company Annex

This small isolated drift mine site of approximately five acres is located about one mile south of Clarksburg and east of the West Fork River and State Secondary Route 25. The Pittsburgh coal seam has been extensively drift mined and partially stripped mined and negligible coal reserves remain. The coal dips fast to the east and an 18 gpm. flow has been measured flowing from the mine opening on the east side of the mine site. The flow discharges into Doll Creek, a tributary to the West Fork River. The pitmouth is open and clean. A small gob pile has been regraded at the pitmouth. Heavy subsidence is in evidence around and over the mine site. While no mine map is available, the proximity of the site to Mine No. 14-042B permits adequate correlation of the mining methods employed.

It is suggested that this opening be sealed by the grouting method, that monitoring and observation be maintained after sealing, and that subsequent work, if required, be performed on the subsidence areas in an attempt to reduce groundwater percolation into the mine. This site represents an excellent prospect for a pilot trial project which would permit the interim evaluation and progressive application of remedial methods including observation of water impoundment pressures and their effects.

Inasmuch as no mine map is available, observations at this mine could employ the use of a television camera or other suitable telemetering methods for observation of the mine interior prior to the application of remedial methods employed.

Aerial photographic coverage is included herein.

Note: See Report of Pilot Trial at Mine No. 14-042A

DATA LIST
WEST FORK RIVER BASIN
MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 14-042A

County Harrison Township Clark State W. Va.

Coordinates 39°15.1'N 80°21.7'W Map Reference Clarksburg 7 1/2'

Receiving Stream Doll Run, a tributary to the West Fork River

Mine Name Penn Coal Co. Annex

Company Name Virginia Allen Corporation - Louis Petitto, Pres.

Surface Owner Bassel and Fidler

Coal Designation Pittsburgh

Elevation 1110'

Area Mined 4 acres

Reserves Negligible drift - Small strip reserves

Mining Method Drift and partial strip

Maximum Overburden 75'

Coal Dip East - Fast

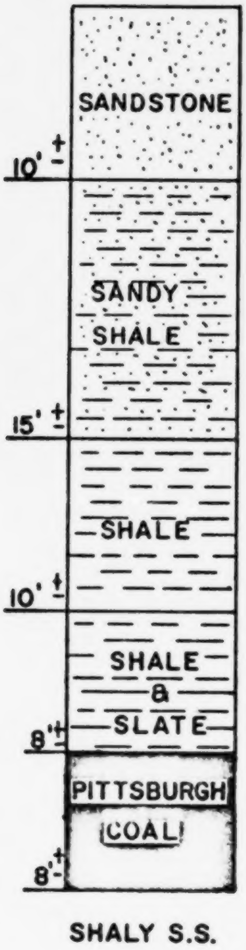
Notes No water or gob available.

No mine map available.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/1	#/day			mg/1	#/day			
2-22-66	8 gpm	2.6	1998	54	0	1120	435.7	12	2819	86.5	1998
	30 gpm	2.5	2350	849	0	1350	480.0	173	3172	145.0	4400
3-17-67	18 gpm	2.6	2750	595	0	920	588.0	127	4160	158.0	4128

Note: Several additional flows were recorded and samples analyzed during the months of April, May, and June 1967; however, the results closely resembled the data listed above and were omitted to avoid repitition.

N
14-042A


SANDSTONE
10' ±
SANDY SHALE
15' ±
SHALE
10' ±
SHALE & SLATE
8' ±
PITTSBURGH COAL
8' ±
SHALY S.S.

GEOLOGIC SECTION

MINE NO.
14-042A

Mine No. 14-042B

Penn Mine of Penn Coal Company

This small isolated drift mine of approximately 15 acres has been mined in the Pittsburgh coal seam and lies immediately east of Mine No. 14-042A. It has been extensively drift mined and approximately three-quarters of the periphery of the mountain top remains as the result of strip mine operations. The mine site also lies about one mile south of Clarksburg and east of the West Fork River and State Secondary Route 25. Access to the mine site is over haulroads to active strip mined areas in the immediate vicinity. Two flows have been observed from seepages at the Pittsburgh coal contour. Flows of 1 gpm. and 3 gpm. have been measured on the east and southeast sides which flow to an unnamed tributary to the West Fork River. Strip mine operators in the area report that an old and limited unstripped area along the north side of the mine site will be removed in the near future. Heavy and extensive subsidence areas have been noted in this area and above the south highwall. A mine map showing partial coverage for the site indicates that uncovering and plugging the east openings would permit monitoring and evaluation of plugging methods applications and techniques and would allow subsequent review of further remedial measures required in subsidence areas at a somewhat larger mine site but one with substantially less flow than that issuing from Mine No. 14-042A.

Flow under the backfill was noted in the southwest side, which may require source location and subsequent plugging by remote methods.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 14-042B

County Harrison Township Clark State W. Va.

Coordinates 39°15.1'N 80°21.7'W Map Reference Clarksburg 7 1/2'

Receiving Stream West Fork River

Mine Name Penn Coal Company

Company Name Virginia Allen Corporation - Louis Petitto, Pres.

Surface Owner Virginia Allen Corporation

Coal Designation Pittsburgh

Elevation 1125'

Area Mined 15 acres

Reserves Negligible drift - Some strip reserves.

Mining Method Drift and partial strip

Maximum Overburden 155'

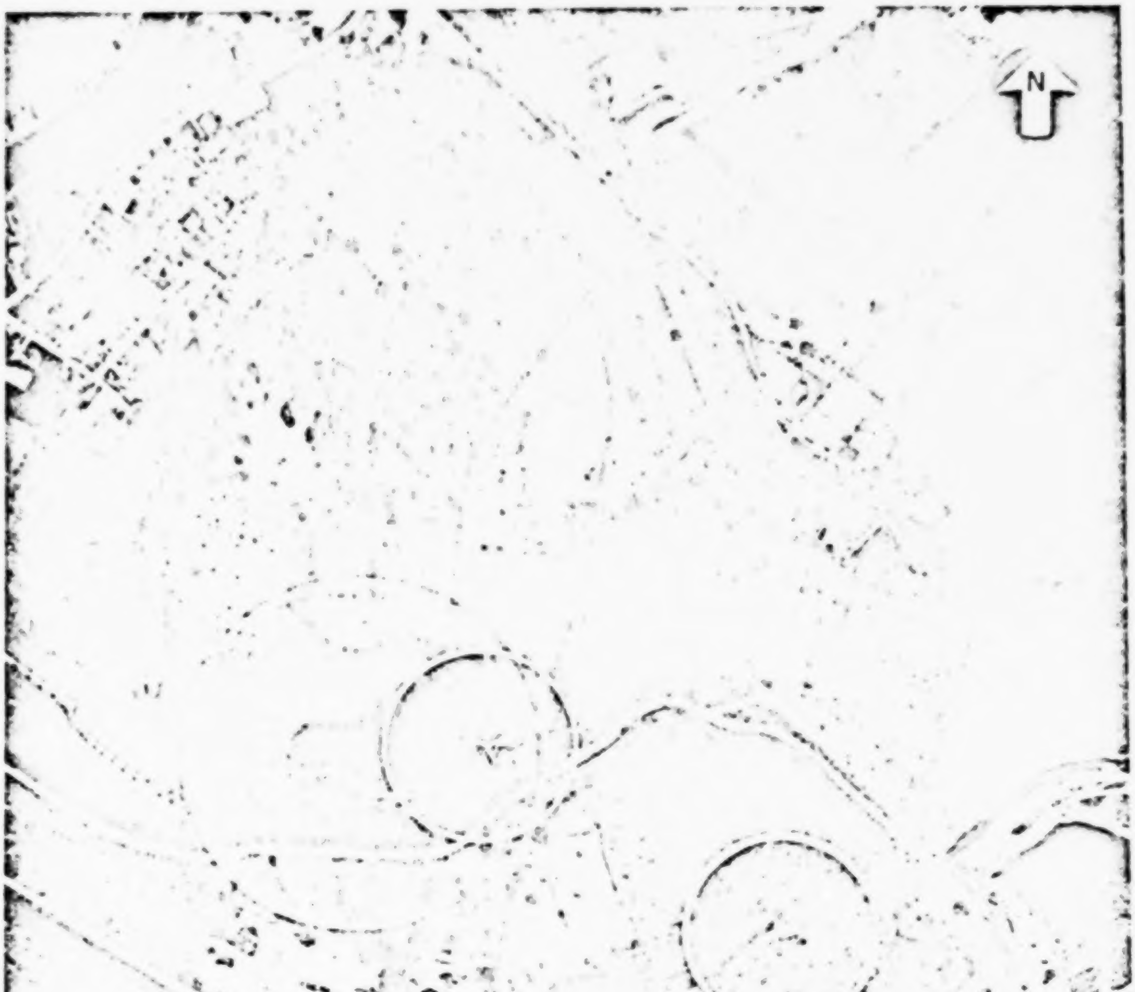
Coal Dip East - Fast

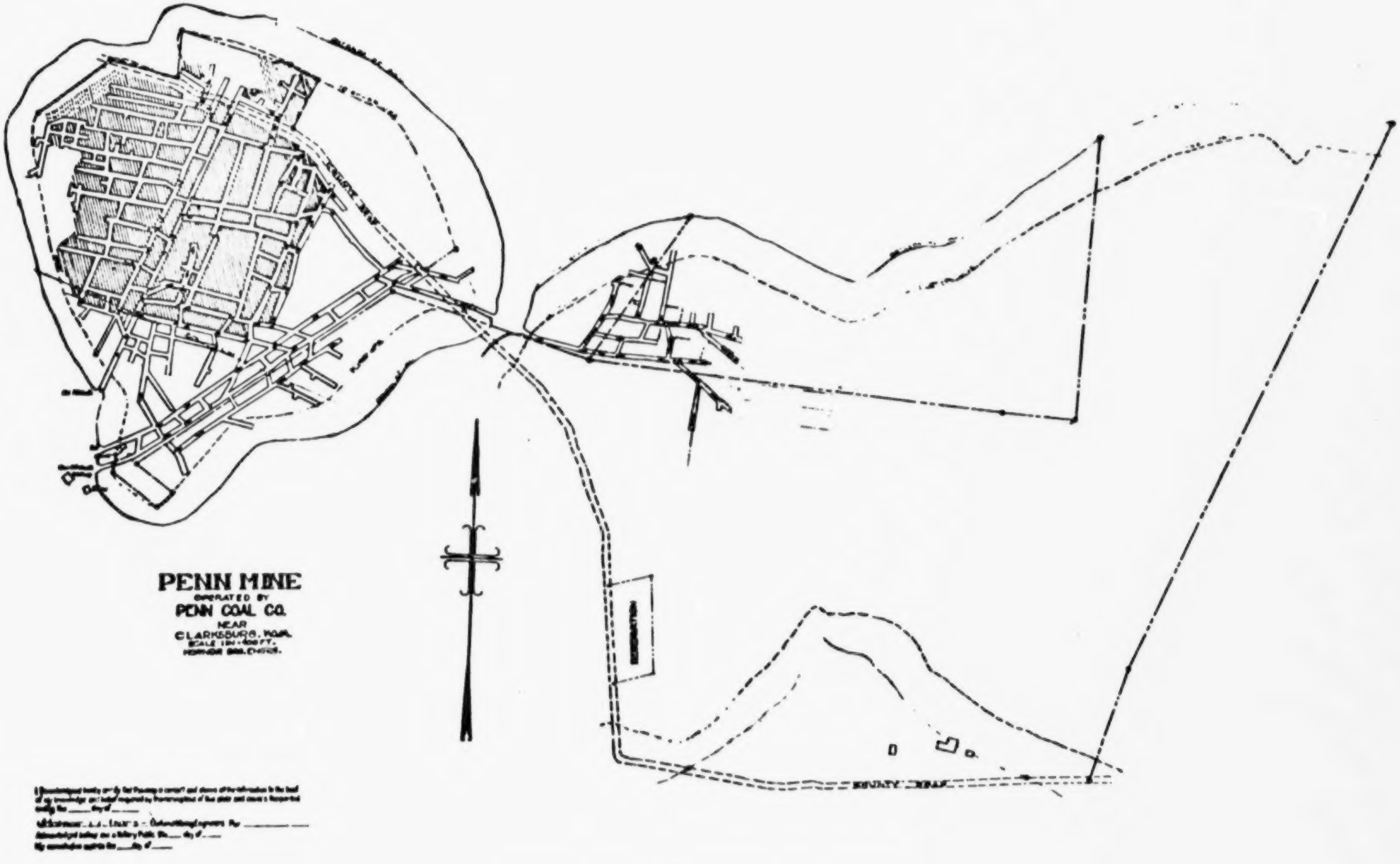
Notes Mine map available.

No water or gob available.

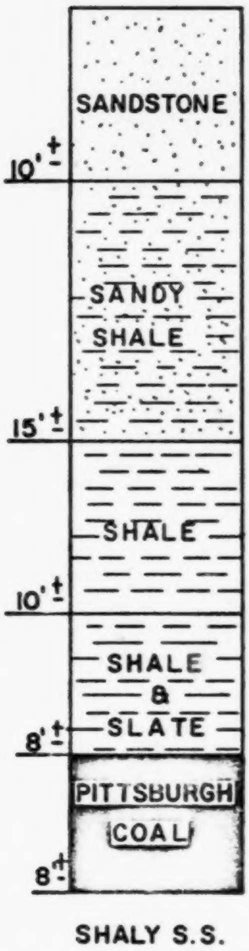
Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
1-26-67	1 gpm	2.6	2530	30	0	1320	552	6.5	3640	1610	3920
3-22-67	1 gpm	6.7	0	0	46	1890	.2	.02	1664	.7	2450

Note: On May 24, 1967 an additional 3 gpm flow was measured to the northeast from a marshy area and a 5 gpm flow was measured coming from under the backfill at the approximate location of the old stripped out pit mouth. Both samples had low pH's of 3 - 3.5 but were not analyzed.


N
14-0428


PENN MINE
OPERATED BY
PENN COAL CO.
NEAR
CLARKSBURG, W.VA.

MINE MAP for MINE NO. 14-042B


SANDSTONE
10' ±
SANDY SHALE
15' ±
SHALE
10' ±
SHALE & SLATE
8' ±
PITTSBURGH COAL
8' ±
SHALY S.S.

GEOLOGIC SECTION

MINE NO.
14-042B

Mine No. 40-005

Calif Mine

This mine site, encompassing some 120 acres of Redstone coal, is situated 4 miles south of Lost Creek on the east side of State Secondary Route 25. The Redstone coal seam is completely isolated and has been extensively drift and strip mined. Stripping has also been undertaken in the underlying Pittsburgh coal seam on a major portion of the mountain periphery. Redstone reserves are estimated at 25 acres whereas the underlying Pittsburgh coal seam has not been deep mined. Limited stripping continues on the mine site. The dip of the coal is slow (N 45°W), and a flow of 11 gpm. has been recorded well below an observed seepage from the Pittsburgh coal seam on the northwest side of the mine site. The flow discharges to an unnamed tributary to McKinney Creek and thence to Hacker's Creek and to the West Fork River.

Analyses of water samples obtained at this mine site indicate the presence of minerals. Two drift openings were located in the Redstone coal seam to the south of this area, and, although obscured by highwall sloughage, were observed to be dry. Despite a shallow impoundment in the nearby strip, no adequate water supply was observed for possible remedial measures. A fairly large gob pile was noted below the Redstone seam drift openings.

A review of the Calif Mine map indicated that the northeast section of this mine site can be further isolated by plugging or sealing the abandoned mine tunnels through a rock fault, thereby permitting consideration of detailed study of remedial methods application. Here, drainage from extensively mined Redstone coal drifts apparently permits ground-water to percolate to the underlying unmined Pittsburgh seam coal prior to reaching the local surface stream.

The southwestern bowl shaped side of the mine site contains a backfilled highwall section for some considerable distance. This highwall is seeping at its base along its entire length. The possibility exists of sealing these seeps by grouting methods, including the injection of a true solution.

As noted in the January 26, 1967 survey, the exposed Pittsburgh coal drift is discharging fluid in the strip mined area at the northern leg of the mine site. The possibility of establishing grout curtains in the area exists in order to divert the percolation of water from the Pittsburgh coal seam.

The location of the source of the mine drainage on the northwest face of the northeast leg of Mine No. 40-005 could be attempted to more clearly identify the mine openings. This would be followed by plugging the drift openings by remote grouting methods. This plugging might be accomplished after the openings had been exposed by augering, hydraulic jetting or other methods.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 40-005

County Harrison Township Grant State W. Va.

Coordinates 39° 23.2'N 80° 21.5'W
39° 08.3'N 80° 21.5'W Map Reference Mt. Clare 7 1/2'

Receiving Stream Unnamed Tributary to Lost Creek and McKinney Run

Mine Name Calif Mine

Company Name Calif Coal Co.

Surface Owner Jack A. Shock and others (Grady Lynch, etc.)

Coal Designation Redstone Drift & Strip, Pittsburgh Strip

Elevation 1420'

Area Mined 121 Acres

Reserves 25 Acres of Redstone. Pittsburgh has not been drift mined

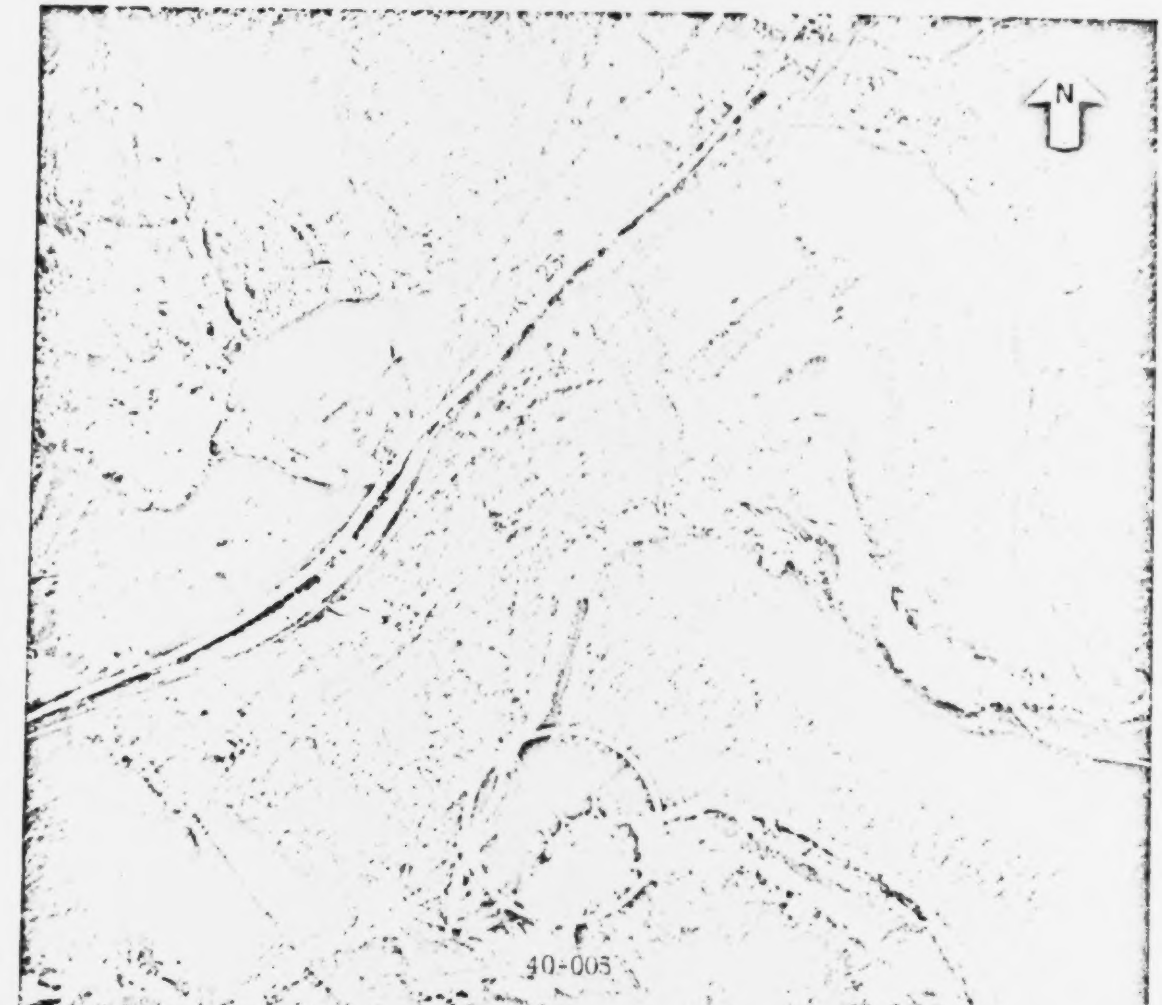
Mining Method Drift and Strip

Maximum Overburden 160'

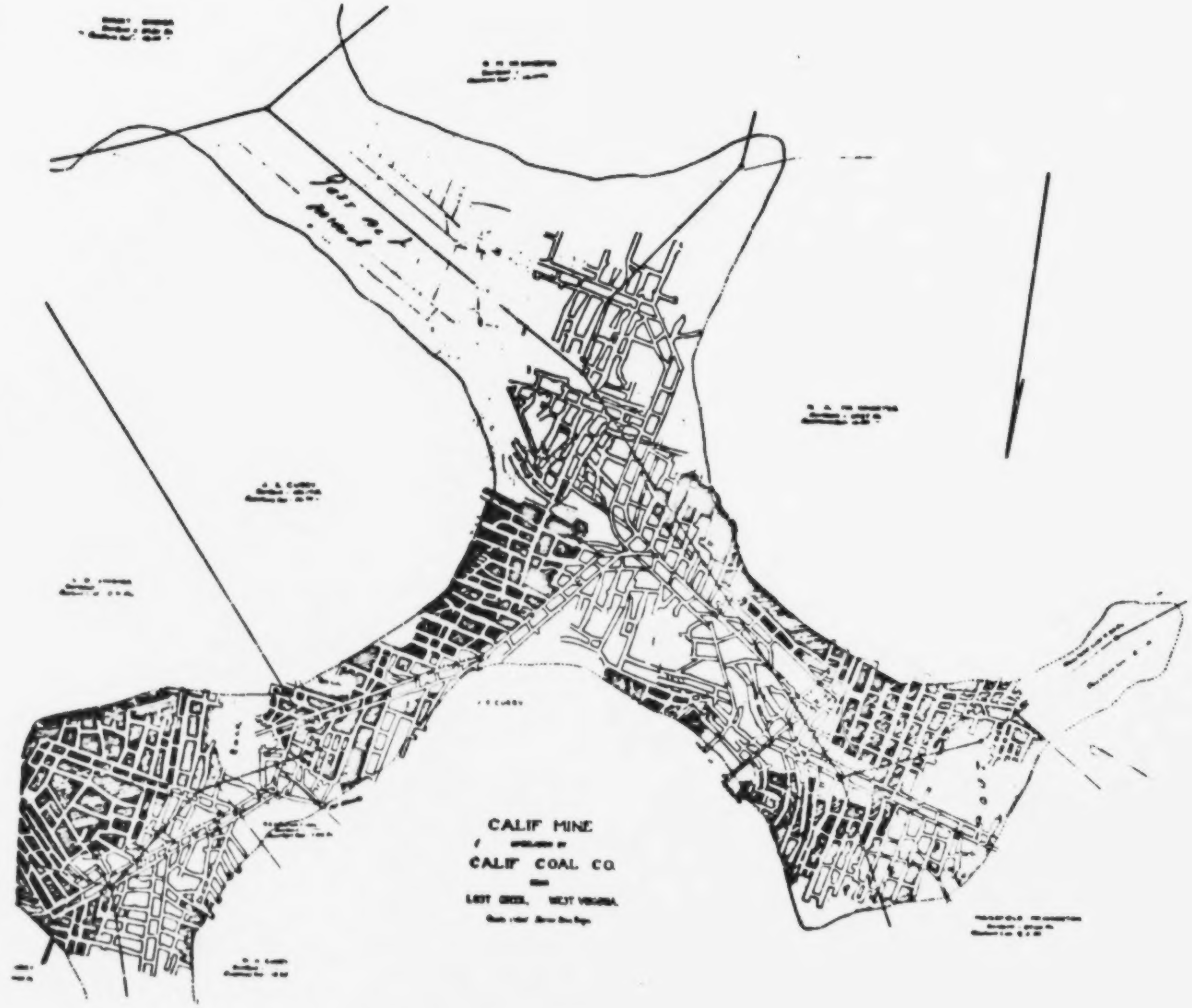
Coal Dip North 45° West - Slow

Notes No water available for remedial methods. There is some (approximately 150' x 100') useable gob.

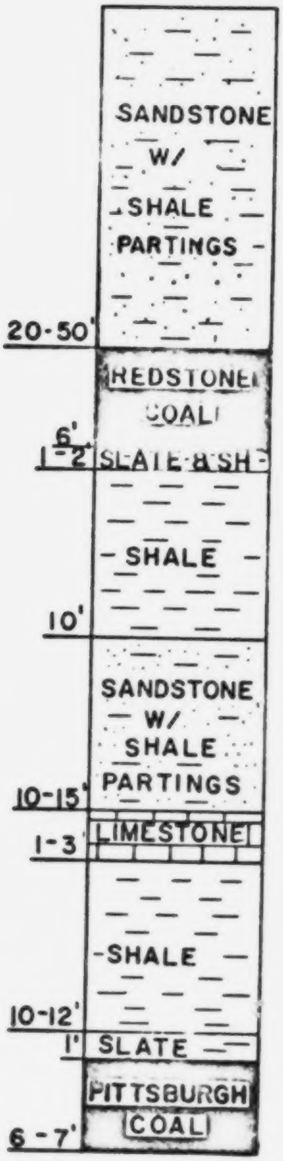
Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
11-4-65	Dry	---	---	---	---	---	----	----	---	---	----
1-11-67	10 gpm	6.4	20	2.4	204	1430	7.2	.87	1118	0	1862
1-26-67	11 gpm	7.5	0	0	201	910	16	2.1	750	0	----
3-29-67	15 gpm	4.5	150	27	0	860	.1	.01	876	21.2	1502



Reproduced from
best available copy.


CALIF MINE
CALIF COAL CO.

MINE MAP for MINE NO. 40-005


SANDSTONE W/ SHALE PARTINGS
20-50'
REDSTONE COAL
6'
1-2'
SLATE & SH
SHALE
10'
SANDSTONE W/ SHALE PARTINGS
10-15'
LIMESTONE
1-3'
SHALE
10-12'
1'
SLATE
PITTSBURGH COAL
6-7'

GEOLOGIC SECTION

MINE NO.
40-005

Mine No. 40-016

Don Garry Coal Co. - Mine No. 2

This is a small abandoned commercial drift mine located south of Clarksburg and midway between West Milford and Lost Creek in Harrison County. Mine openings can be observed in both the Pittsburgh and Redstone coal seams with the major headways located in the Pittsburgh seam. Both Pittsburgh and Redstone coal has been stripped mined.

This opening has been isolated from Mine No. 40-017 by strip mining operations. Mine drainage flows have been observed issuing from the openings in the Pittsburgh coal seam and slight seepage was noted at the Redstone drift opening. Extensive augering has been performed into the south side of this island which is visible in the Redstone coal seam. Land reclamation backfill covers the Pittsburgh seam and obscures any augering which may have been performed. Water, as a source of supply for remedial methods, is not available at this mine site. Gob is scattered in the vicinity. No land subsidence was observed in the overburden, which reaches a maximum height of 110 feet. Drainage from this mine site discharges to Lost Creek and has measured flows ranging from 7 to 150 gpm.

Remedial measures for mine drainage abatement could include sealing the Pittsburgh and Redstone drift openings by remote grouting methods. Also, the placement of vertical and horizontal grout curtains could be attempted because conditions for monitoring the mine effluent would be favorable. Some gob located on the north side of the drift mine openings could be utilized as an ingredient for cementing or plugging slurries. Auger holes previously mentioned could be plugged to prevent entry of ground and surface waters into the mined area. Redstone drift openings permit creation of favorable ground conditions for subsequent grouting.

[illegible] location of this mine, in addition to the physical conditions which would permit many material-methods applications, would tend to make it an ideal mine site for further study.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 40-016

County Harrison Township Grant State W. Va.

Coordinates 39° 11.2'N 80° 22.2'W Map Reference Mt. Clare 7 1/2'

Receiving Stream Stone Pot Run, a tributary to Lost Creek

Mine Name Don Garry Coal Co. - Mine No. 2

Company Name (Don Garry Coal Co. - Drift) & (Tasa Coal Co. - Strip)

Surface Owner and Coal Owner Porter and Brent Maxwell heirs

Coal Designation Pittsburgh and Redstone

Elevation 1190' (coal)

Area Mined 3 acres of Redstone, Augered; 2 acres of Pittsburgh

Reserves 8 acres of Redstone, 9 acres of Pittsburgh

Mining Method Redstone & Pittsburgh Drift & Strip (abd)

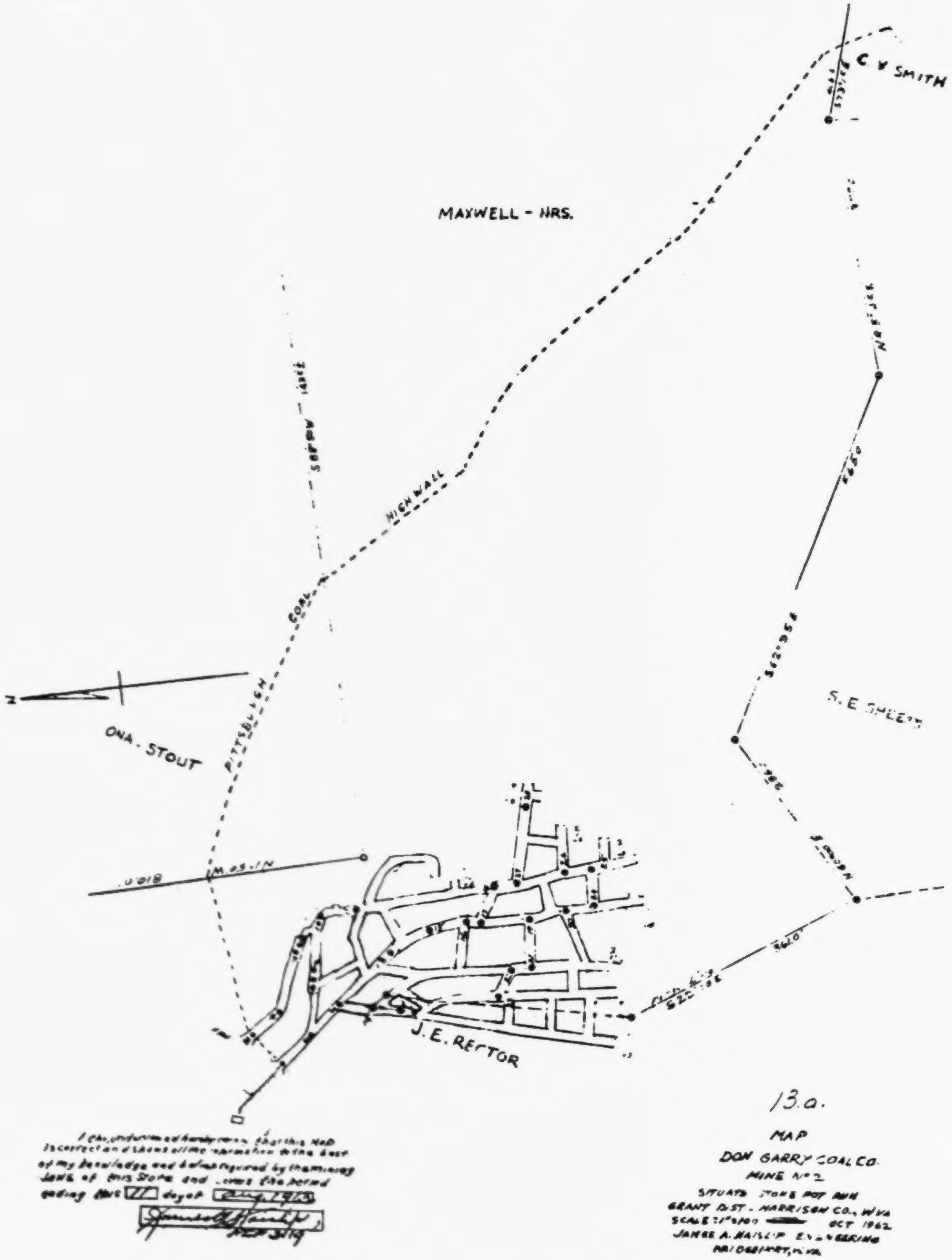
Maximum Overburden 110'

Coal Dip North 45° West - Fast

Notes Water for abatement methods would have to be pumped or hauled from Lost Creek. There is a small amount of gob scattered over old tipple area.

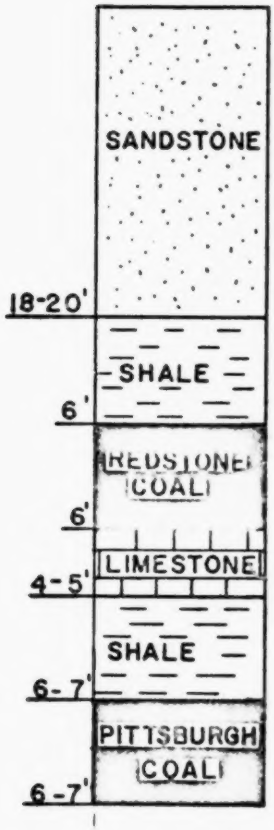
Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
11-9-65	6.8gpm	3.0	962	79	0	2040	173	14	3000	28.8	3500
1-12-67	8 gpm	2.9	860	82.5	0	1820	120	11.5	2132	69	3260
1-26-67	15 gpm	2.85	306	55.1	0	1768	151	27.2	2400	11	----
3-22-67	150 gpm	3.4	705	1273	0	1440	189.6	342.4	3640	58.4	2748

N
C. R. 25/14
9-016


C. Y. SMITH
MAXWELL - HRS.
N 85° 50' E
SAPAW
HIGH WALL
PITTSBURGH COAL
N
ONA. STOUT
S. E. SHEETS
S 12° 35' E
M. 85-1 N
J. E. RECTOR
13.a.
MAP
DON GARRY COAL CO.
MINE No 2
SITUATE STONE POT RUN
GRANT DIST. - HARRISON CO., W.VA
SCALE: 1" = 100' OCT 1962
JAMES A. HAISLIP ENGINEERING
BRIDGEPORT, W.VA.

I the undersigned hereby certify that this map is correct and shows all the information to the best of my knowledge and belief required by the mining laws of this State and covers the period ending the 11 day of Aug. 1963

MINE MAP for MINE NO. 40-016


SANDSTONE
18-20'
SHALE
6'
REDSTONE COAL
6'
LIMESTONE
4-5'
SHALE
6-7'
PITTSBURGH COAL
6-7'

GEOLOGIC SECTION

MINE NO.
40-016

Mine No. 40-017

Crumrine Coal Co. - Mine No. 6

This mine site is an abandoned commercial drift mine located adjacent to Mine No. 40-016 and about midway between West Milford and Lost Creek in Harrison County. The drift mine is in the Pittsburgh coal seam which also has been extensively augered and strip mined and the stripped area has been reclaimed. The total area of the mine is 39.50 acres of which 1.82 acres is deep-mined. This mine may be interconnected with much older and abandoned drift mine workings (Thermal Coal Co.) to the southwest, and these may also drain to Mine No. 40-017. Water drains from the pitmouths which are closed and flows up to 15 gpm. have been recorded well below the elevations of the openings. The mine water discharges to Stone Pot Run, a tributary to Lost Creek and carries high mineral loads. Gob has not been found in significant quantities for remedial measures and water is not available at this mine site; however, water is available from Lost Creek approximately 3/4 of a mile away. No subsidence areas over the pitmouths were observed, since these areas were probably removed by the stripping operations.

Remedial measures would include plugging or sealing the obscured pitmouths which might require opening by excavation. This plugging might also be done remotely. Interconnected drifts could be explored and if such drifts connect to larger complexes, as is mentioned above, these interconnections might be plugged by means of vertically drilled grout holes from the surface. This area also offers the possibility of horizontal and/or vertical grout curtain placement.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER

MONONGAHELA RIVER MINE D AGE PROJECT

Mine Number 40-017

County Harrison Township State W. Va.

Coord 9° 11.2'N 80° 21.6'W p Reference Mt. Clare 7 1/2'

Re am Stone Pot Run, a tributary to Lost

Mine Name Crumrine Coal Co. Mine #6

Company Name Crumrine Coal Co.

Surface Owner and Coal Owner Porter and Brent Maxwell heirs

Coal Designation Pittsburgh

Elevation (coal) 1200'

Area Mined 1.82 acres

Reserves 37.68 acres

Mining Method Drift, auger and strip in Pittsburgh. Strip only in Redstone

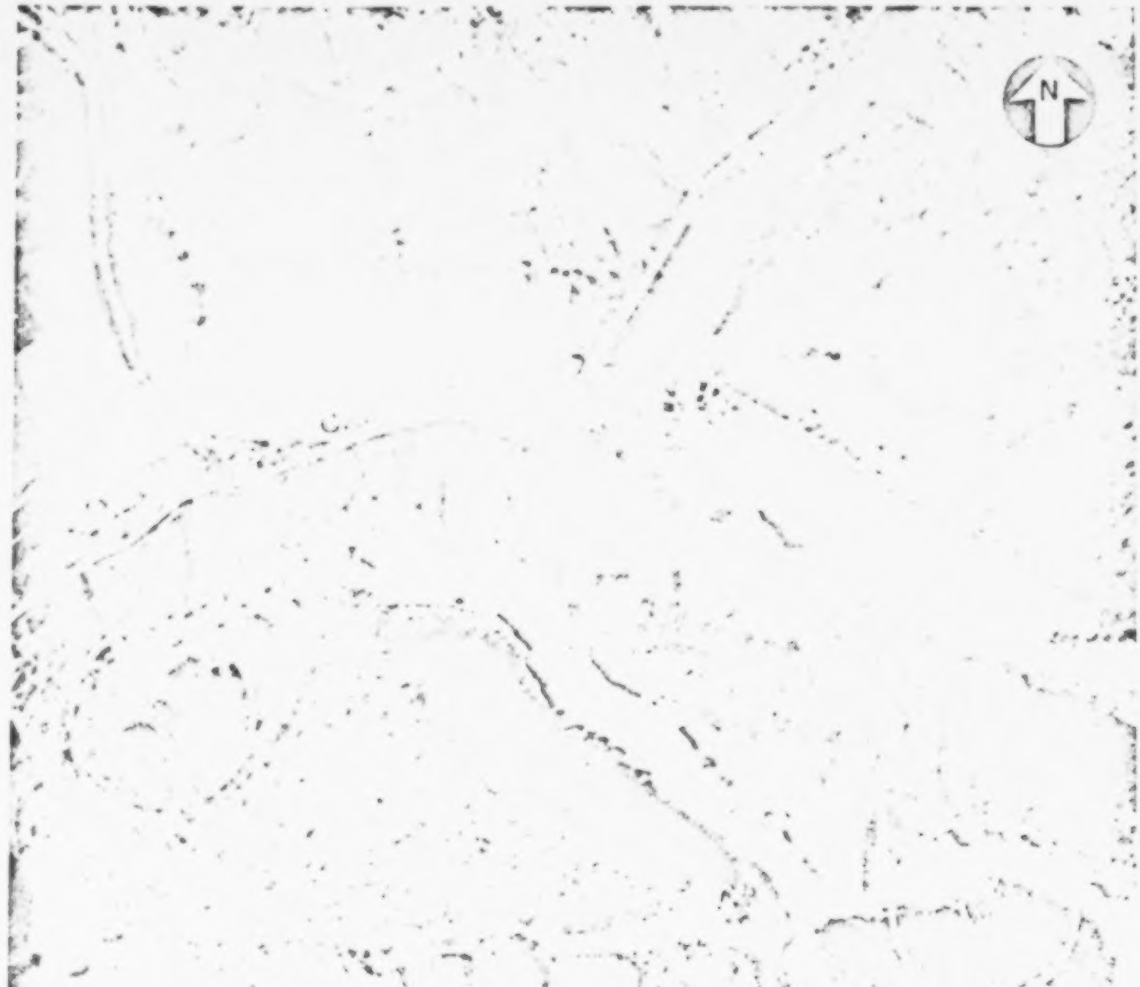
Maximum Overburden 300'

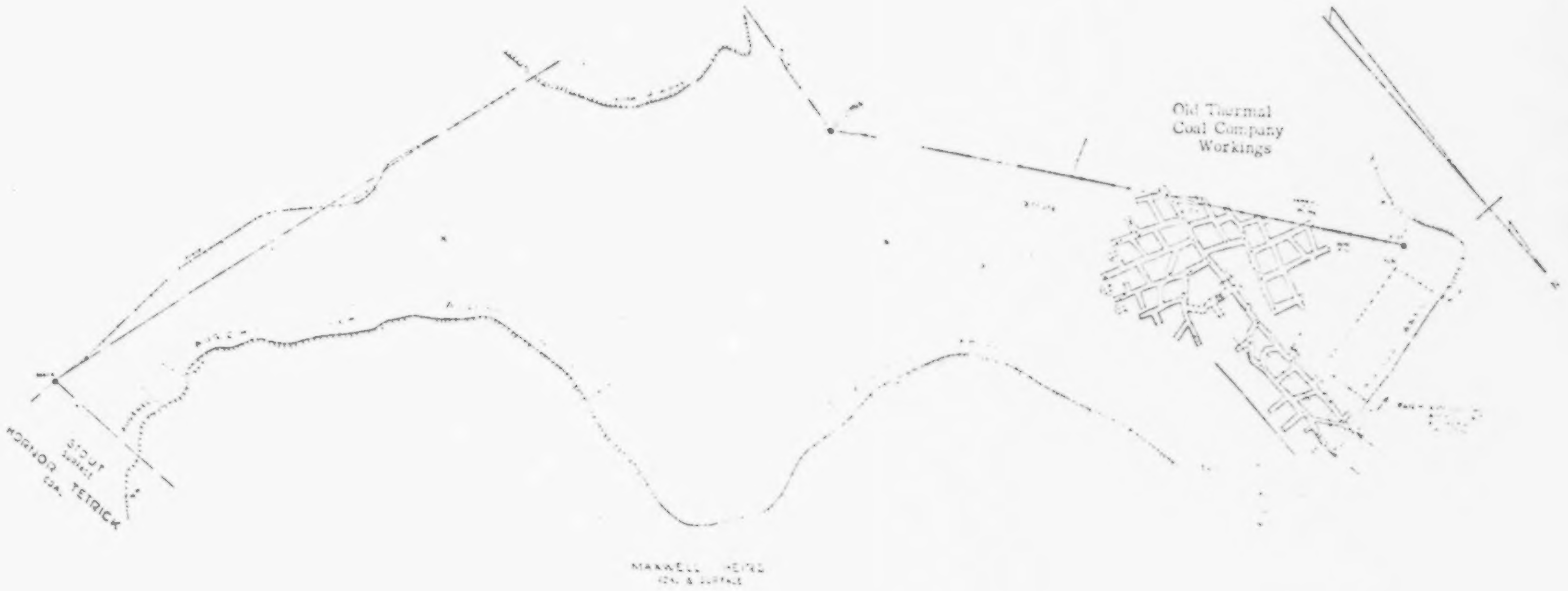
Coal Dip North 45° West - Fast

Notes Water for abatement methods would have to be pumped or hauled.

No gob of consequence, has been removed by strip.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
11-9-65	8.2 gpm	2.9	1040	103	0	1550	171	17	2180	39.2	3250
1-12-67	15 gpm	2.8	1710	308	0	1720	516	93	3536	90	3420
1-27-67	13 gpm	2.5	1724	270	0	1710	572	89.5	3900	30	----

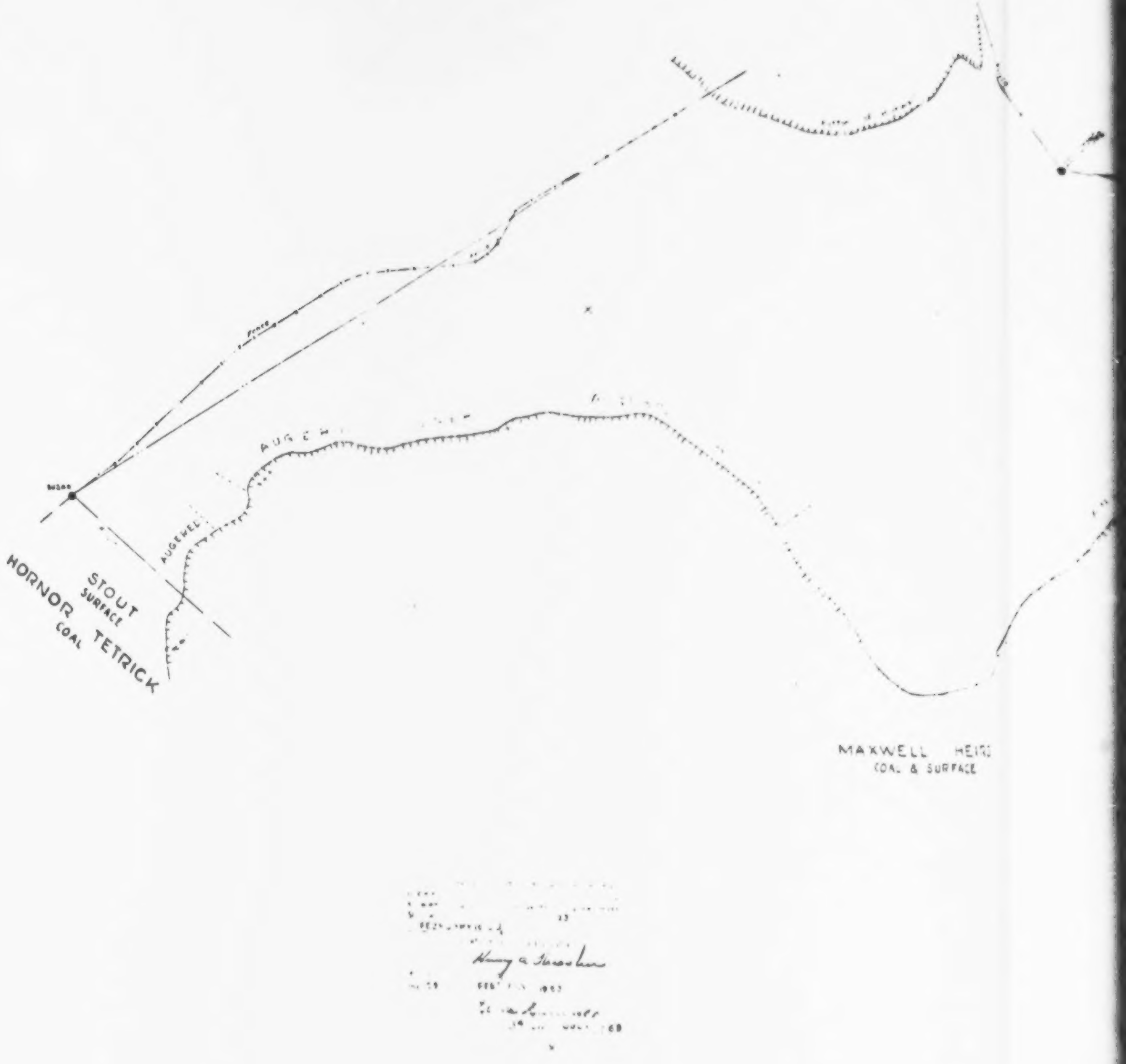

N
40-017


Old Thermal
Coal Company
Workings
STOUT
SURFACE
HORNOR TETRICK
COAL
MAXWELL HEIRS
COAL & SURFACE

XXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXX

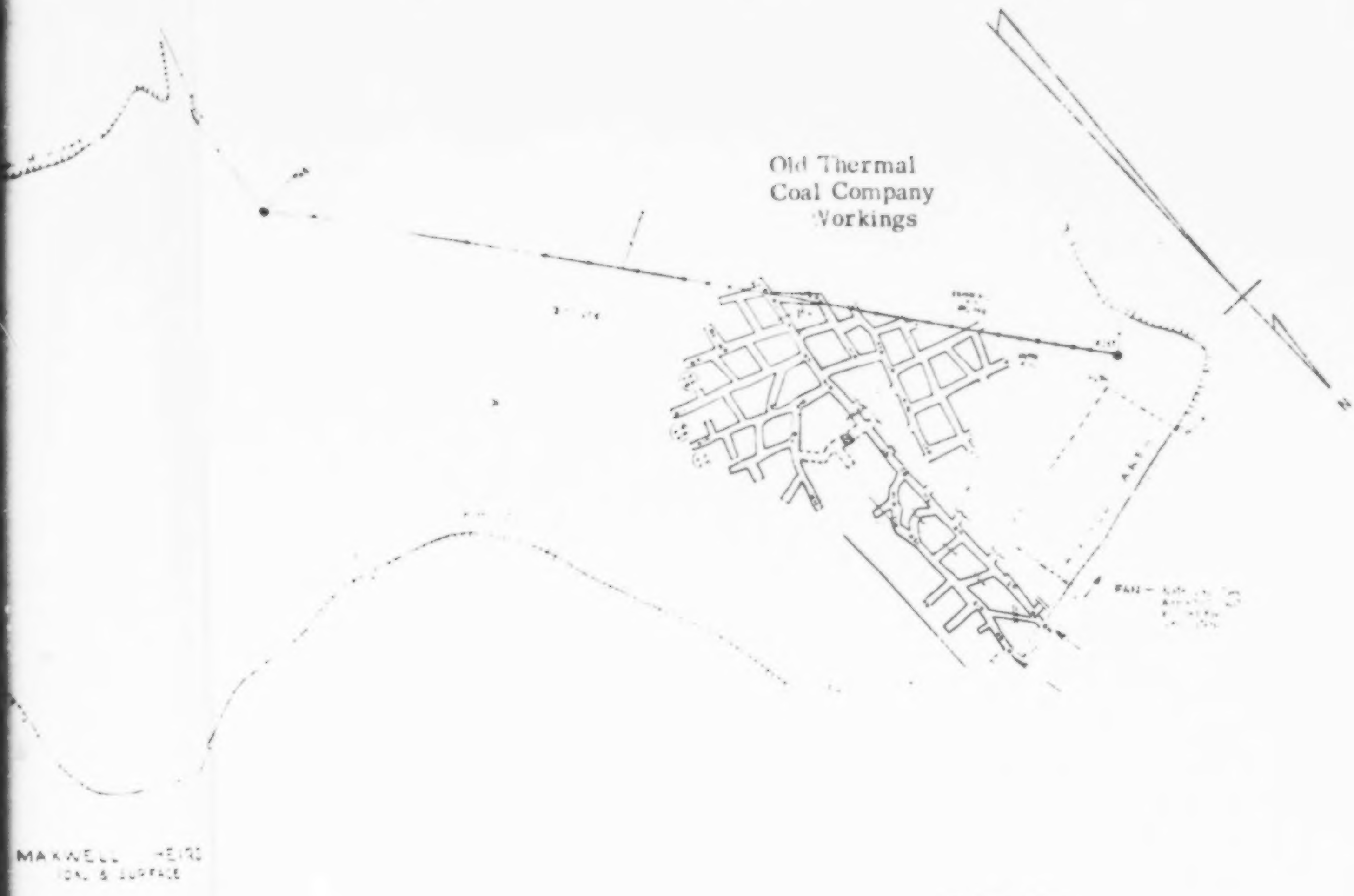
MAP OF
CRUMRINE COAL CO.
MINE NO. 6
STONE POT RUN
GRANT DIST., HARRISON CO., W.VA.
SCALE 1"=100'
HORNOR BROS. ENGRS.

MINE MAP for MINE NO. 40-017


STOUT
SURFACE
HORNOR TETRICK
COAL
Fence
AUGERWELL
MAXWELL HEIR
COAL & SURFACE

MINE MAP for MINE NO. 40-017

A


Old Thermal
Coal Company
Workings
N
FAN
MAXWELL HEIRS
COAL & SURFACE

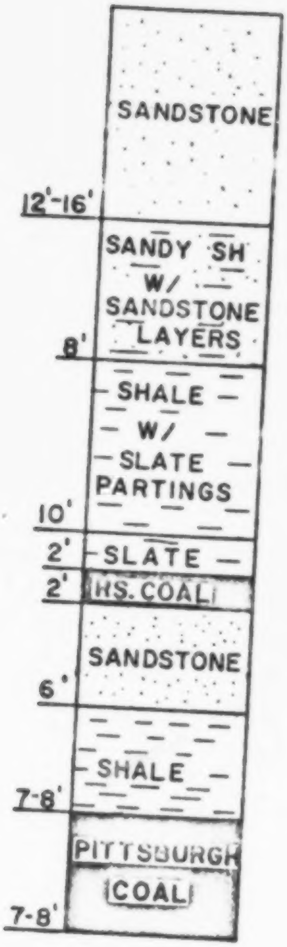
MAP OF

CRUMRINE COAL CO.

MINE NO. 6

STONE POT RUN
GRANT DIST., HARRISON CO., W. VA.
SCALE 1" = 100'
HORNOR BROS. ENGRS.

B


SANDSTONE
12'-16'
SANDY SH W/ SANDSTONE LAYERS
8'
SHALE W/ SLATE PARTINGS
10'
SLATE
2'
HS. COAL
2'
SANDSTONE
6'
SHALE
7-8'
PITTSBURGH COAL
7-8'

GEOLOGIC SECTION

MINE NO.
40-017

Mine No. 40-058

Stout Mine

This abandoned commercial drift mine is located in Harrison County about 1.5 miles south of Mount Clare and east of Brown's Creek. The mine has been partially drifted in the Pittsburgh coal seam; however, the coal has only been completely stripped to this seam thereby isolating the mine site. Since 50% of the coal has been deep-mined, a sizable reserve of unmined coal should be encountered at this mine site. The mine survey map does not indicate any extensive pillaring and no local subsidence was noted. The two probable drift openings are completely collapsed and the area identified with their location is extremely marshy. Drainage from the strip spoil bank, including several seepages as well as drainage from the probable drift openings, was measured at 20 gpm.

As regards remedial measures proposed for the abatement of mine drainage, the pitmouths would be sealed or plugged subsequent to their identification. Gob which is available in limited quantities on the site could be incorporated into the remedial measures proposed. Water is not available at this site.

This mine site possesses characteristics similar to the majority found in the Sub-basin and these lend themselves to method-material applications being developed. Monitoring conditions after completion of the remedial measures should be ideal.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 40-058

County Harrison Township Grant State W. Va.

Coordinates 39° 11.8' N 80° 19.9' W Map Reference Mt. Clare 7 1/2'
39° 11.9' N 80° 19.8' W

Receiving Stream Brown's Creek

Mine Name Stout Mine

Company Name Ross F. Stout Heirs

Surface Owner Bob Mandez

Coal Designation Pittsburgh

Elevation (coal) 1300'

Area Mined 7 Acres

Reserves 8 Acres

Mining Method Drift and complete strip

Maximum Overburden 280'

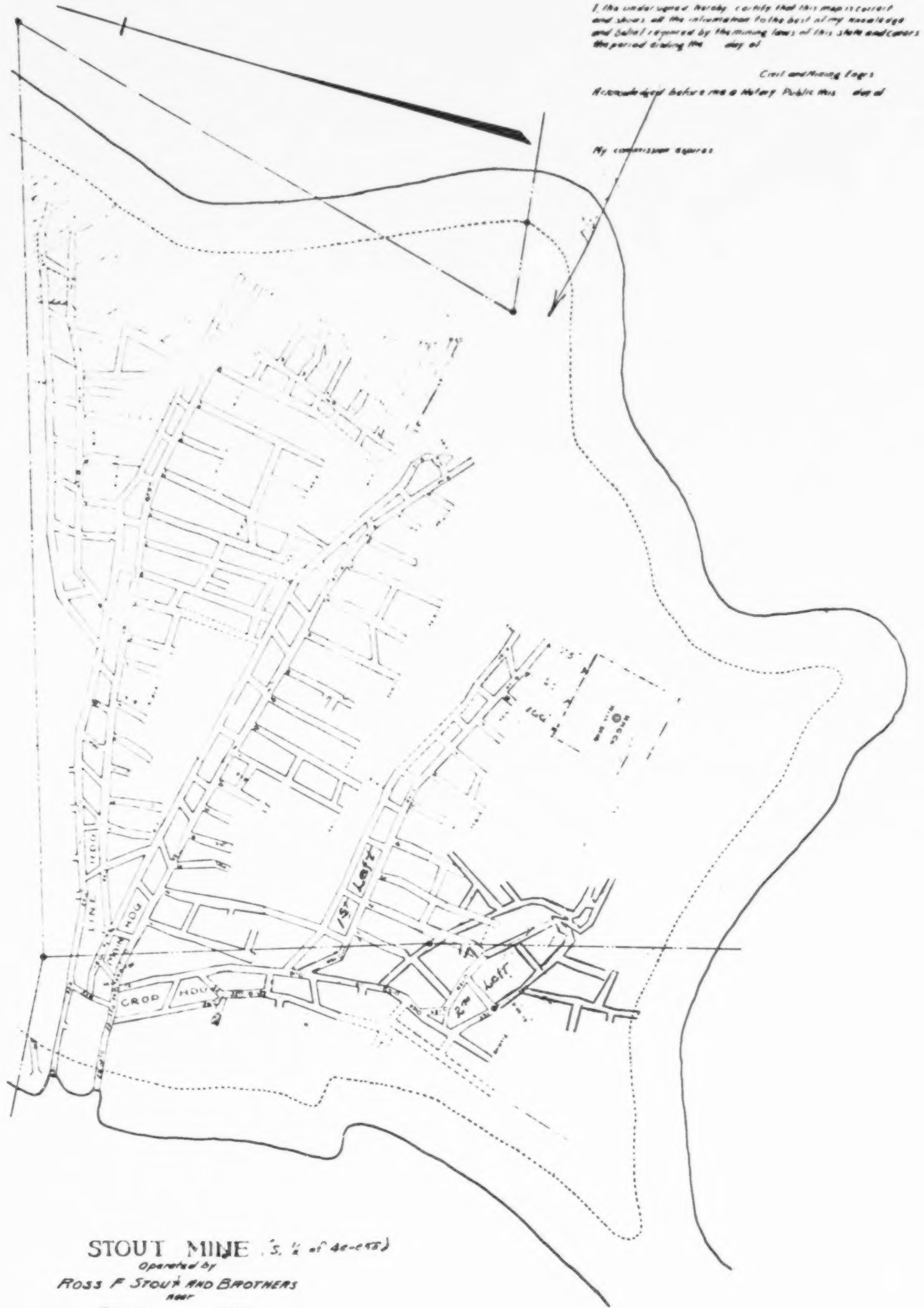
Coal Dip North 60° - Slow

Notes

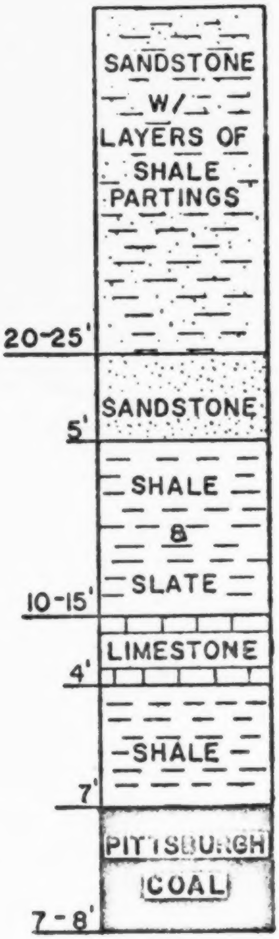
Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
1-12-65	1.5 gpm	6.1	690	12.2	208	2200	22.6	.4	1740	0.1	3000
1-11-67	Seep	4.4	200	1.2	0	2060	58.0	.34	1924	0	2680
3- 2-67	3) 9 "	7.2	10	.24	397	3830	1.2	.03	1846	0	2900
	*4) 20 "	5.4			21						2748

* Complete analysis not run because of age of sample.

N
40


I, the undersigned hereby certify that this map is correct
and shows all the information to the best of my knowledge
and belief required by the mining laws of this state and covers
the period ending the day of
Civil and Mining Engrs
Acknowledged before me a Notary Public this day of
My commission expires
LINE HOU
MAIN HOU
CROP HOU
1st Left
2nd Left
STOUT MINE (S. ½ of 40-058)
Operated by
ROSS F STOUT AND BROTHERS
near
Byron WVA
scale 1"=200'

MINE MAP for MINE NO. 40-058


SANDSTONE W/ LAYERS OF SHALE PARTINGS
20-25'
SANDSTONE
5'
SHALE & SLATE
10-15'
LIMESTONE
4'
SHALE
7'
PITTSBURGH COAL
7-8'

GEOLOGIC SECTION

MINE NO.
40-058

Mine No. 58-007

Clinksburg Mine

This mine site reportedly contains four openings to an abandoned drift operation in the Pittsburgh coal seam. The openings are located about two miles west of Weston on the Murphy Creek Road in Lewis County. Mine maps are not available for the mine and consequently no estimate of the mined coal or remaining reserves can be made. One opening was draining and a flow of 10 gpm. was recorded. The analysis of a sample of this mine drainage indicated heavy acid loads and iron loads. Mine drainage discharges directly to Murphy Creek and thence to the West Fork River at Weston. The mine opening was partially collapsed and the mine drift appears to be open beyond the pitmouth. Small gob piles are present on the site; however, water would have to be obtained from Murphy's Creek.

Remedial measures would include plugging and sealing the openings after identification of both the reported and observed openings had been made. Should augering, hydra-jetting, or mechanical excavation of these mine openings indicate the drifts are open, plugging might be accomplished by use of the Expendable Grout Retainers or hydraulically placing aggregate to create conditions for subsequent grouting. Gob could either be disposed of or possibly utilized, in processed form, as an additive to the cementing material.

Aerial photographic coverage is included herein.

[illegible]
007, 010, 012
[illegible]
No [illegible]

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 58-007 Location: 2 miles W. Of Weston, W. Va. on Murphy's Creek Road

County Lewis Township Freeman's Creek State W. Va.

Coordinates 39° 02.2' N 80° 31.5' W Map Reference Vadis 15' Quad.

Receiving Stream Murphy's Creek

Mine Name Clinksburg Mine

Company Name Paul Gabbert (Beck Fuel & Supply Company) - Coal Owner

Surface Owner J. A. Fischer

Coal Designation Pittsburgh

Elevation (coal) 1240'

Area Mined Unknown

Reserves Unknown

Mining Method Drift

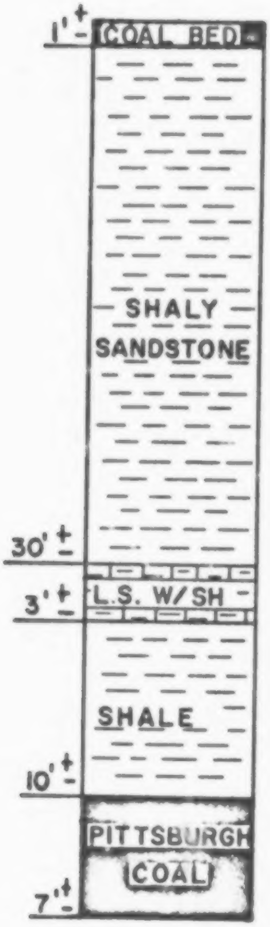
Maximum Overburden 160'

Coal Dip South - East

Notes Water for remedial work must be pumped or hauled from Murphy's Creek, small gob piles present.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
4-20-63	9.6 gpm	3.0	169	28	6	110	40.1	7	212	7.4	527
1-14-67	.5 "	No sample taken.									
3-1-67	10. "	2.8	390	46.9	0	450	49.2	5.9	436	13.0	1500

N
58-007


1' ±
COAL BED
SHALY
SANDSTONE
30' ±
L.S. W/SH
3' ±
SHALE
10' ±
PITTSBURGH
COAL
7' ±

GEOLOGIC SECTION

MINE NO.
58-007

Mines No. 58-010 and 58-012

A. C. Fisher Mine

These two abandoned Pittsburgh drift mines are located approximately 2-1/2 miles west of Weston, W. Va. in Lewis County. Although originally investigated as 2 separate mines, indications are that these two drift mines are connected.

Mine No. 58-010 has one open drift and another closed by subsidence. Two other possible mine openings were noted and these had collapsed and were dry. A maximum flow of 10 gpm. was recorded on March 1, 1967 at the open mine mouth.

Mine No. 58-012 contains a single collapsed mine opening which was completely covered by debris and was emitting a flow of 5 gpm. Effluent from these two mines discharges to a tributary of Murphy's Creek which flows into the West Fork River immediately south of Weston, W. Va.

The dip of the coal indicates the pattern of drainage at the mine opening. Access to Mine No. 58-010 is poor, but fairly good to Mine No. 58-012. A small amount of gob is located on the site and water is not readily available at either mine. Only one small subsidence area was located and it was situated near the 12' coverline on Mine No. 58-010.

No mine maps are available for these combined mine sites. Remedial methods would involve location of the mine drainage sources by probing or excavation at the openings and the plugging of these mine openings by means of Expendable Grout Retainers or by remote grouting methods. Grouting in the subsidence area could be attempted to prevent water entry into the mine.

Aerial photographic coverage for these combined mine sites is included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 58-010

County Lewis Township Freeman's Creek State W. Va.

Coordinates 39° 02' N 80° 31' W Map Reference Vadis 15' Quad.

Receiving Stream Unnamed tributary to Murphy's Creek

Mine Name A. C. Fischer Mine

Company Name Paul Gabbert (Beck Fuel & Supply Company) - Coal Owner

Surface Owner J. A. Fischer

Coal Designation Pittsburgh

Elevation (coal) 1240'

Area Mined Unknown

Reserves Unknown

Mining Method Drift

Maximum Overburden 210'

Coal Dip Due South - Fast

Notes

Date	Flow		pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type	ground		mg/l	#/day			mg/l	#/day			
4-20-65	45	gpm	3.8	*18	10	0	23	2.4	1	28	1.4	120
	1) .75	"	3.0	280	2.57	0	260	11.2	.1	410	21.2	1000
1-14-67	2) 2.5	"	2.9	390	11.7	0	290	53.0	1.6	507	15.0	1320
	1) 30	"	3.3	90	32.5	0	100	1.3	.47	78	3.8	320
3- 1-67	2) 10	"	3.0	70	8.4	0	250	8.8	1.0	148	4.4	600

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 58-012 Location: 2 1/2 miles West of Weston, adjoining 58-010.

County Lewis Township Freeman's Creek State W. Va.

Coordinates 39° 02 N 80° 31.5' W Map Reference Vadis 15' Quad.

Receiving Stream Unnamed tributary to Murphy's Creek

Mine Name A. C. Fischer Mine

Company Name Paul Gabbert (Beck Fuel & Supply Company) - Coal Owner

Surface Owner I. A. Fischer

Coal Designation Pittsburgh

Elevation 1250'

Area Mined Unknown

Reserves Unknown

Mining Method Drift (abd)

Maximum Overburden 160'

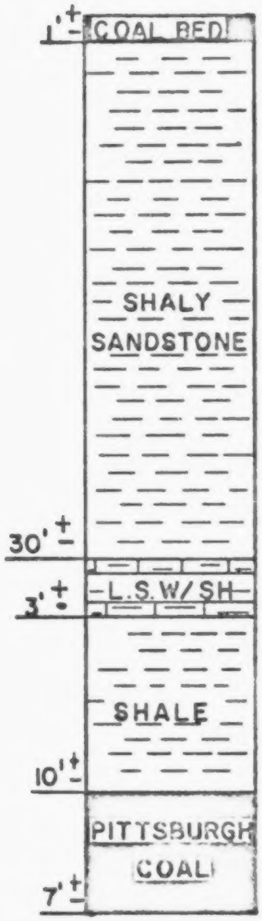
Coal Dip South - East

Notes Water must be pumped or hauled for remedial work

No gob of any consequence.

Date	Flow		pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground			mg/l	#/day			mg/l	#/day			
4-20-65	10	gpm	3.1	76	9	0	51	4.6	1.0	92	2.9	430
1-14-67	.5	"	No sample taken.									
3- 67	5	"	3.2	90	5.4	0	250	2.1	.12	60	2.7	340

N
58-010
58-012
S. R. 22


1' ±
COAL BED
SHALY SANDSTONE
30' ±
L.S. W/SH
3' ±
SHALE
10' ±
PITTSBURGH COAL
7' ±

GEOLOGIC SECTION

MINE NO.
58-010 & 58-012

Mine No. 58-017

Reed Harper Mine

This abandoned drift and strip mine is located 2-1/4 miles northwest of Jacksons Mill, Lewis County, West Virginia. The mine is draining and the effluent flows into Millstone Run, a tributary to Freeman Creek, and thence to the West Fork River. Mining operations, both drift and strip, have been performed in the Pittsburgh seam which is approximately 7 feet thick. The elevation of the coal seam is 1240 feet and dips fast to the south. The maximum overburden above it to the crest of the hill is 235 feet. Earl and John Garrett are the surface owners. The coal owner is the Gauley Company (B&O Railroad). No mine map is available and therefore no estimate of the amount of coal mined or of that remaining can be made.

The mine is an old drift mine showing evidences of two openings 60 feet apart which have been obscured by stripping operations. The exact location of the openings is unknown; however, from the appearance of the sloughing highwall, ponded water, the water temperatures and flows, the general vicinity of these openings may be assumed. The ponded water (approximately 250' x 40') adjacent to the assumed openings also receives some surface runoff from a small valley. It is estimated that 10% of the total flow draining the impoundment originated in the mine. The flows recorded, dates, and analyses are listed in detail on the data sheet.

The access to the stripped area is good but the highwall is inaccessible and is falling. Some regrading and drainage work should be done before the site could accommodate heavy equipment adjacent to the openings. Water for remedial measures is available from the existing pond; however, should the pond be drained prior to the performance of any remedial work, other sources must be located. Gob in any large quantity is not available at the site.

Before any remedial measures are employed, the exact location of the openings would be ascertained by seismic methods, probing or earth moving. Following this, the openings could be plugged or sealed utilizing Expendable Grout Retainers, quick setting slurries, or the placement of aggregate in the drift opening to create conditions suitable for grouting the aggregate.

Aerial photographic coverage is included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 58-017

County Lewis Township Freeman's Creek State W. Va.

Coordinates 39° 07.5N 80° 30.2"W Map Reference Vadis 15' Quad.
39° 07'33"N 80° 30' 21"W

Receiving Stream Millstone Run

Mine Name Reed Harper Mine

Company Name Gauley Company (B&O Railroad)

Surface Owner Earl and John Garrett

Coal Designation Pittsburgh

Elevation 1240'

Area Mined Unknown

Reserves Unknown

Mining Method Drift, then Strip. (abd)

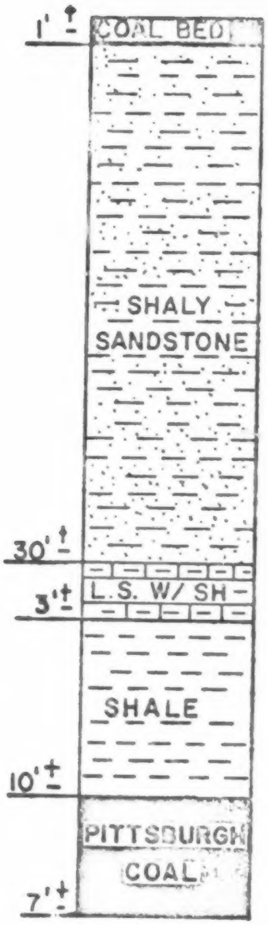
Maximum Overburden 235'

Coal Dip South - East

Notes Old drift opening obliterated by stripping. Water seeping out of highwall.
Impoundment present and area is swampy.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/1	#/day			mg/1	#/day			
4-20-65	#1 87.0 gpm	7.3	8.0	18	22	485	3.9	5.0	456	.4	842
	#2 20.0 "	7.1									
1-14-67	10 "	5.7	30	3.6	15	1100	2.4	.289	962	6.0	1640
1-31-67	80	6.9	0	0	118	770	59(61)	58.6	590	5(0)	
	(Est. 10% from mine, 8gpm)	7.2	0	0	63	320	3(11)	.28	280	2(0)	
4-12-67	30	7.2	0	0	229	720	1.2	.43	559	4.0	1240

N
C. R. 10/11
53-017


1' ±
COAL BED
SHALY SANDSTONE
30' ±
L.S. W/ SH
3' ±
SHALE
10' ±
PITTSBURGH COAL
7' ±

GEOLOGIC SECTION

MINE NO.
58-017

Mine No. 62-002

Steve Tefer Mine

This site is an abandoned drift mine in the Redstone coal seam and is located approximately one mile north of the town of McWhorter and one-half mile west of State Secondary Route 25 in Harrison County. The drift is located in an isolated coal seam which has also been augered (42" diameter). The island caused by circumferential stripping operations is approximately 10 acres in area; however, since mine maps are not available, the extent of the drift mine operation is not known. The Pittsburgh coal seam has been exposed by earlier stripping operations. Two drift openings were located one on the east side of the island was dry; a second on the west side had a 10' x 6' opening partially closed by a highwall slide and water was impounded behind the partially closed entrance. A flow of 6.5 gpm. was recorded below the mine opening at the elevation of the Pittsburgh coal seam. This flow drains to a tributary to Duck Creek. Water analyses indicated some iron load with a neutral or boric condition. The dip of the coal seam generally confirms the observation of the mine drainage pattern. Gob from another site, situated approximately one-half mile away, is available for remedial measures. Water would have to be transported about one-half mile also.

Remedial methods would include plugging the drift openings, backfilling the strip and sealing the flow from the Pittsburgh coal seam.

Aerial photographic coverage is included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 62-002 Location: 1 mile N. of McWhorter and 1/2 mile West of Rt. 25.

County Harrison Township Grant State W. Va.

Coordinates 39°08.7' 80°22.7' / 39°08.6' 80°22.9' Map Reference W. Milford 7 1/2' (NW 4 Weston)

Receiving Stream Unnamed tributary to Duck Creek

Mine Name Steve Tefer Mine

Company Name Tefer Mining

Surface Owner and Coal Owner: Ode Bright, Ralph Davison, & Iden McWhorten

Coal Designation Redstone

Elevation Coal: 1325'

Area Mined Unknown

Reserves Unknown

Mining Method Drift, Auger, and Strip

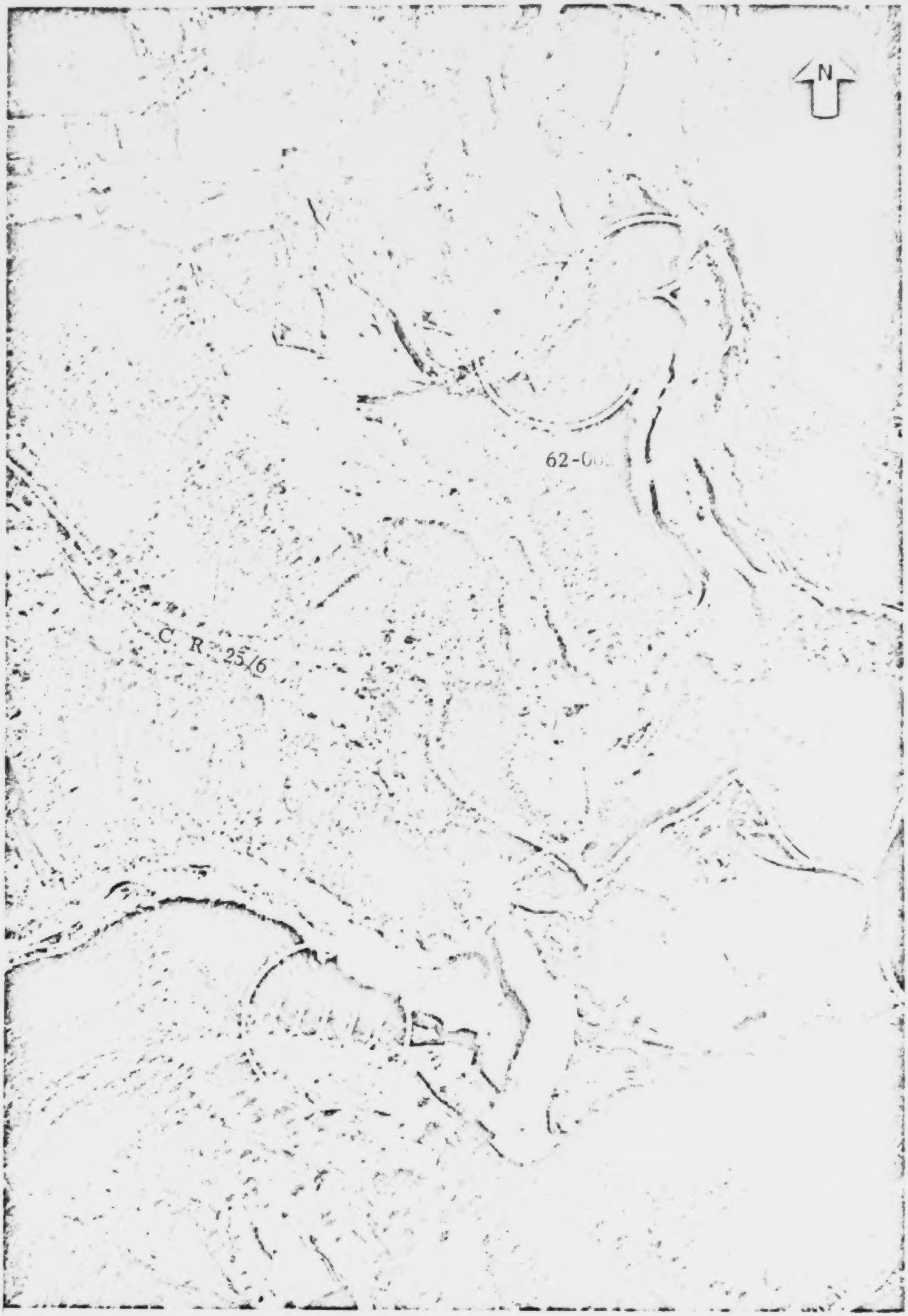
Maximum Overburden 195'

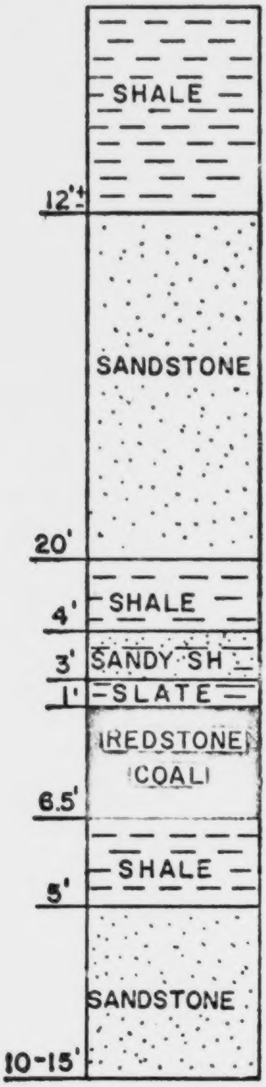
Coal Dip North - East

Notes Water for remedial work is available about 1/2 mile away.

Some gob is available, but not much, about 1/2 mile from mine site.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
9-21-65	4 gpm	8	218	3	156	1870	2.6	0	1890	0.8	2600
1-13-67	3 "	5.8	20	.74	162	1720	4.0	.13	1508	0	2444
1-25-67	6.5 "	6.4	0	0	172	1600	33	2.5	1650	2	


N
62-00
C. R. 25/6


SHALE
12'±
SANDSTONE
20'
SHALE
4'
SANDY SH
3'
SLATE
1'
REDSTONE
COAL
6.5'
SHALE
5'
SANDSTONE
10-15'

GEOLOGIC SECTION

MINE NO.
62-002

Mine No. 62-008

Pettito Brothers Mine #2

This is a small abandoned drift mine complex three miles west of Lost Creek in Harrison County and belongs to the Petitto Brothers. Twenty acres of Pittsburgh coal have been deep-mined and approximately 130 acres remain in reserve. The Redstone coal contains a small drift mine and has been augered, as has the Pittsburgh seam. The coal seams are isolated at this site. The total area of the island is approximately 150 acres and the periphery has been stripped for the Pittsburgh and Redstone. A steep continuous highwall makes access to the overburden difficult. Subsidence at the cover line did not exist. Three openings were observed in the Redstone coal. An airshaft was collapsed but appeared dry. A second (13' x 7' pitmouth) seeps onto the strip. A third opening (12' x 7') had water impounded in the drift. Seepage was noted near this opening but at the Pittsburgh seam level.

Four openings were observed in the Pittsburgh coal. One, a possible airway (11' x 5'), was open and draining slightly. Two headings (11' x 5' and 9' x 4') were also open and draining slightly. The fourth opening was a 4-foot diameter airway which was collapsed and dry. The combined flows at the three openings was recorded at 5 gpm. Sample analyses indicated that high mineral loads were being discharged to an unnamed tributary to Lost Creek. The coal seams dip fast to the east, which establishes the observed drainage pattern. Three fresh water impoundments were found on the site. Gob was not available in large quantities, but could be gotten from another site about one-half mile away.

Mine No. 62-008

Remedial methods would include sealing the Redstone drifts and monitoring the Pittsburgh mine openings and auger holes in order to determine any possible reduction of discharge.

Prior to plugging the Pittsburgh mine openings, various methods could be utilized, including spraying and coating, in an attempt to exclude the water from the mine. It is improbable that further mining will occur at this site unless there is a great demand for coal since clay veins occur in both the Pittsburgh and Redstone coal seams. The removal of this clay would increase handling costs and tend to render deep mining not econimically feasible.

However, since much coal of questionable quality remains in this mine, consideration should be given to placing a temporary or low strength grouting material for the sealing operation.

Aerial photographic coverage and a mine map of the Pittsburgh drift mine are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 62-008 **Location:** 3 miles W. of Lost Creek on south side of road.

County Harrison Township Grant State W. Va.

39°10.6 80°23.2'
Coordinates 39°10.6' 80°23.3' Map Reference W. Milford 7 1/2' (NW 4 Weston)

Receiving Stream Unnamed tributary to Lost Creek

Mine Name Petitto Brothers' Mine #2

Company Name Petitto Brothers' Coal Company.

Surface Owner Petitto Brothers' Coal Co.

Coal Designation Redstone augered and both Pittsburgh and Redstone Stripped and Drift mined.

Elevation 1200'

Area Mined 150 acres (total area)

Reserves 130 acres

Mining Method Drift

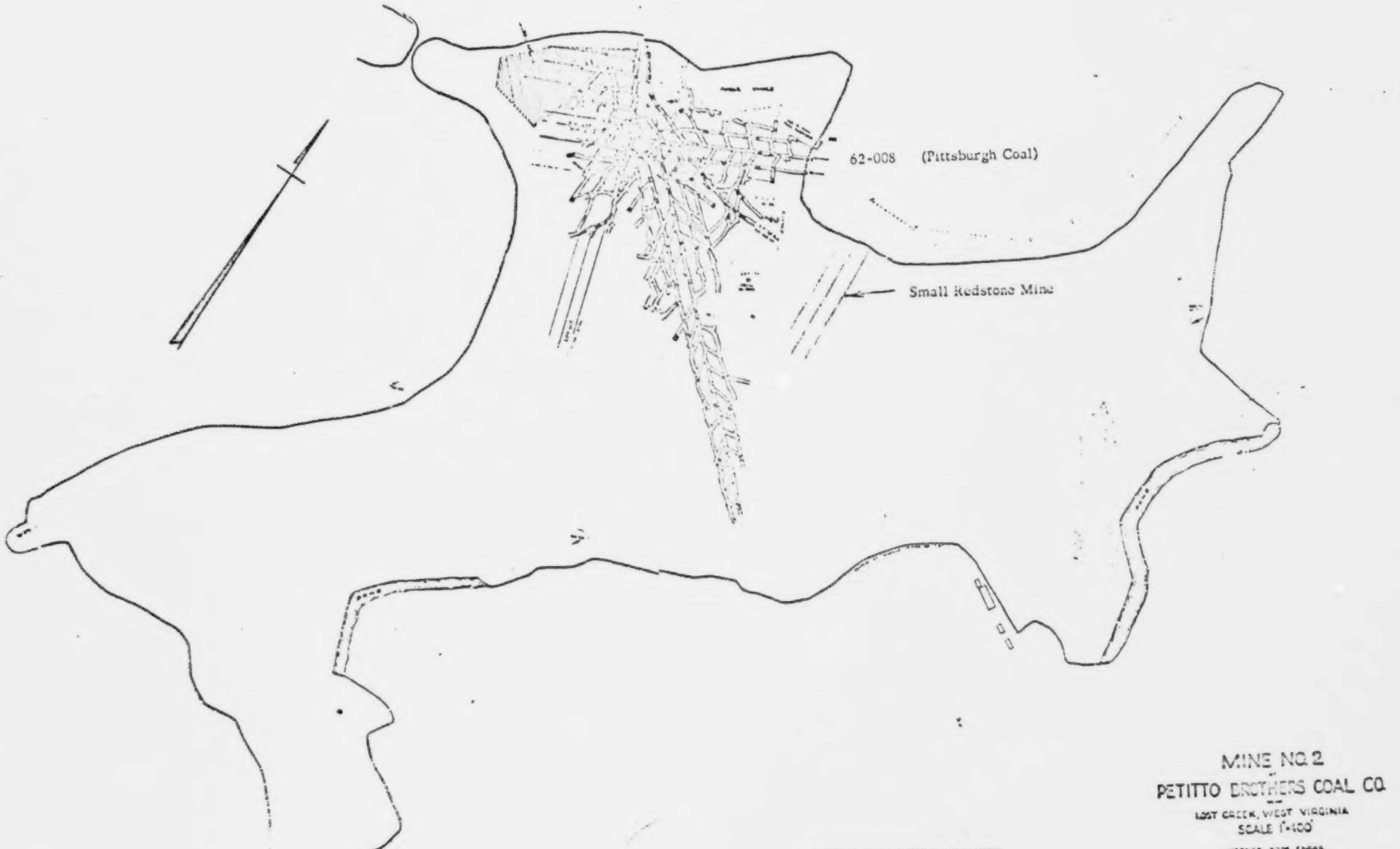
Maximum Overburden 340'

Coal Dip East - Fast

Notes Water available, 3 impoundments. Gob available, may have to be hauled 1/2 mile.

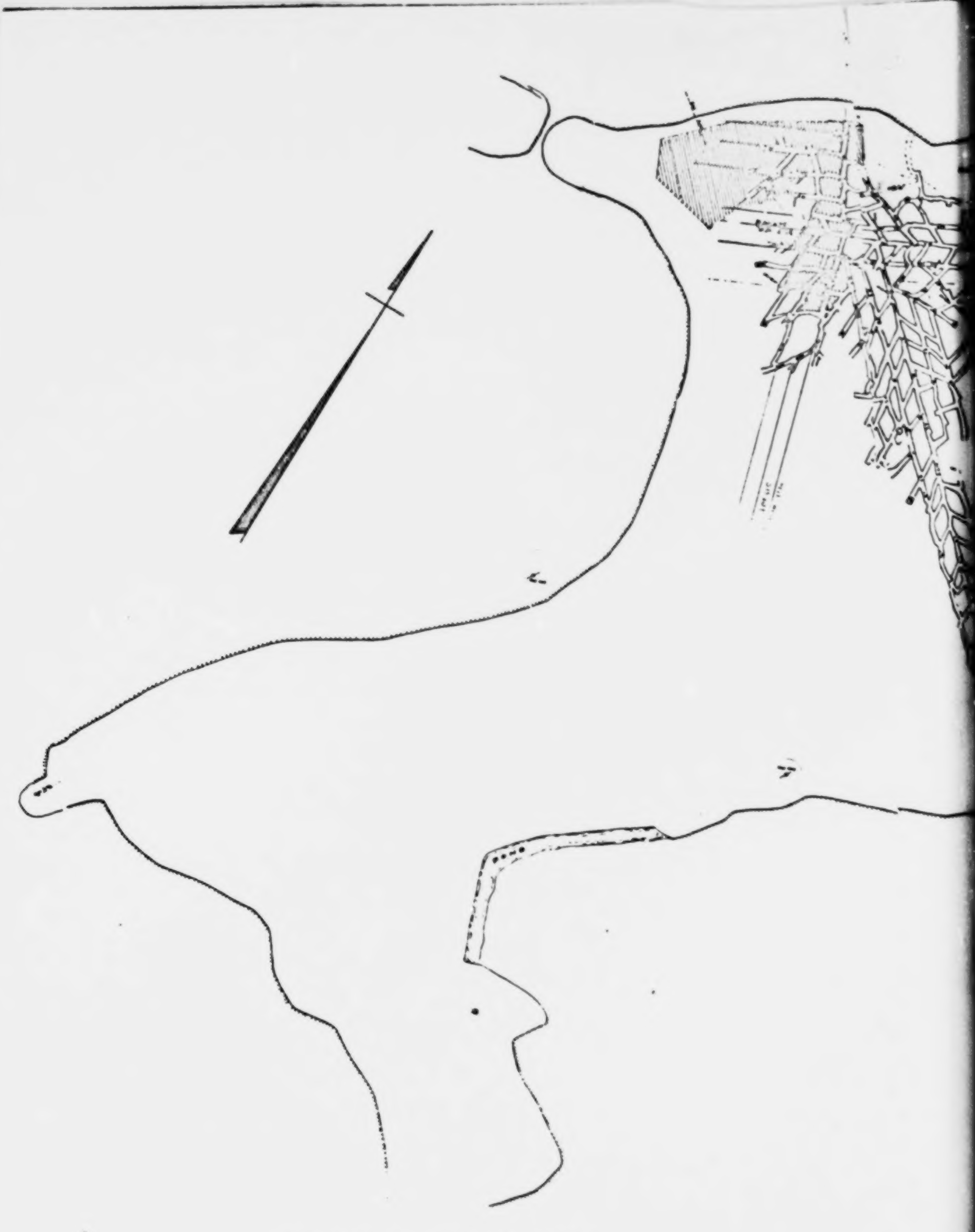
Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/1	#/day			mg/1	#/day			
9-22-65	8.6 gpm	3.1	821	85	0	2045	108.8	11	3090	12.1	5250
1-13-67	5 "	2.8	880	53	0	1050	30	1.8	2600	150	5164
1-26-67	5 "	2.85	459	27.5	0	960	119	7.1	3500	15	

N
62-008

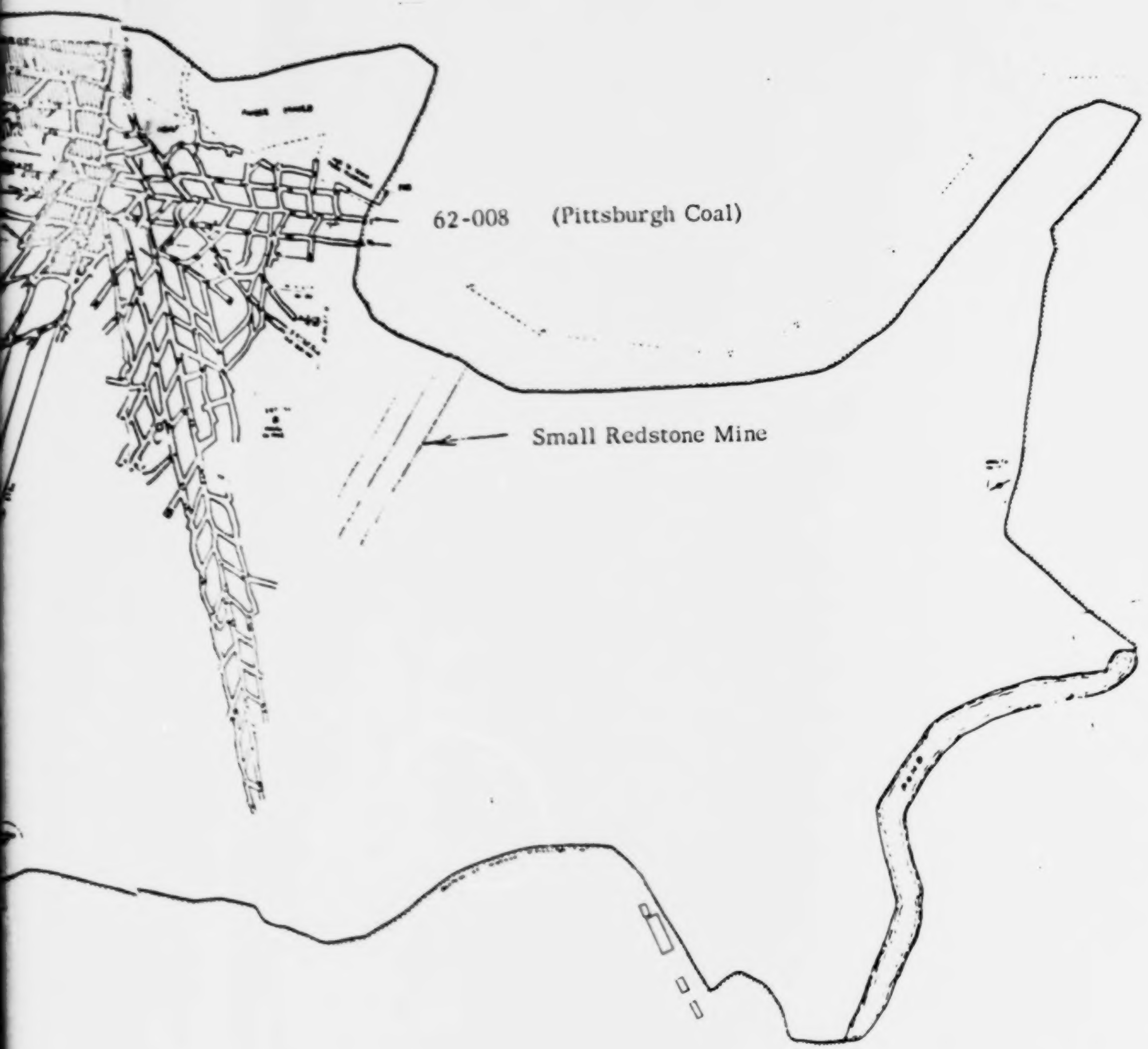

62-008 (Pittsburgh Coal)
Small Redstone Mine
MINE NO.2
PETITTO BROTHERS COAL CO.
LOST CREEK, WEST VIRGINIA
SCALE 1"=400'

XXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXXX

MINE MAP for MINE NO. 62-008



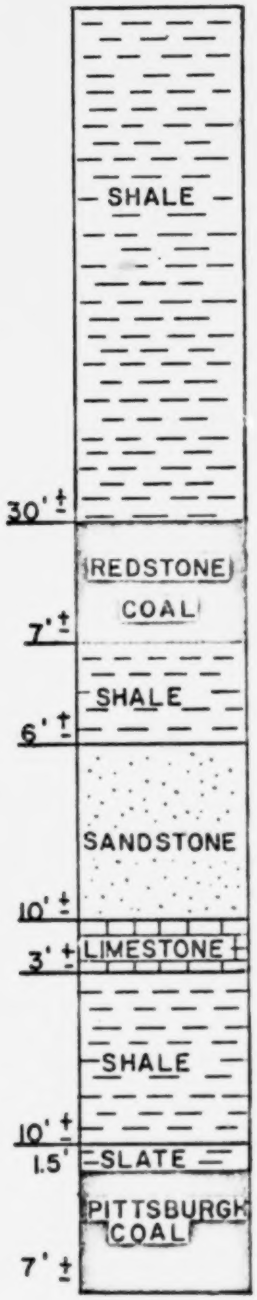
MINE MAP for MINE NO. 62-008


62-008 (Pittsburgh Coal)
Small Redstone Mine

MINE NO. 2
of
PETITTO BROTHERS COAL CO.
near
LOST CREEK, WEST VIRGINIA
SCALE 1"=400'

HORNOR BROS ENGRS.

B


SHALE
30' ±
REDSTONE
COAL
7' ±
SHALE
6' ±
SANDSTONE
10' ±
LIMESTONE
3' ±
SHALE
10' ±
1.5'
SLATE
PITTSBURGH
COAL
7' ±

GEOLOGIC SECTION

MINE NO.
62-008

Mine No. 62-013

Penneeco Coal Company

This site consists of an old, large complex of abandoned drift mines known as the Penneeco Coal Company mines and is situated about one mile north of McWhorter and one-half mile west of State Secondary Route 25 in Harrison County. Drifts are found in both the Redstone and Pittsburgh coal seams. Of a total of twenty possible openings observed, fifteen were in the Redstone and five in the Pittsburgh seams. The area, with the exception of the mine openings, has been stripped to the Pittsburgh coal. Of a total area of 75 acres, an estimate of coal reserves is 6 acres of strip coal. While the recorded dip of the coal is fast to the north, the openings from which drainage has been observed drain on the south face of the site. This might be attributed to local structure differences in the mine area. The recorded flows are small, and the effluent from one Pittsburgh opening indicates high acid and iron content. The effluent discharges to McKinney Run. Extensive and widespread subsidence exists above the Redstone drifts at and near the 12' cover line. The entire area is now in pasture. Mine seals and mine seal markers are in evidence. Moderate amounts of gob and water are available on site for remedial methods. Potential remedial methods would include plugging and sealing where flows are noted; mine seal restoration, renovation or grouting; and filling or regrading subsidence areas to improve surface runoff. The north side, or normal downdip side of the coal, which has been stripped, would then be monitored to determine new or modified mine drainage patterns. Should new outcroppings of mine drainage occur on the north side, spraying of its highwall or grouting of small flows might be performed to abate these flows or seeps.

Aerial photographic coverage and a mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 62-013

County Harrison Township Grant State W. Va.

Coordinates 39° 08.2' N 80° 23.4' W
39° 08.2' N 80° 23.1' W

Map Reference NW 4 Weston Quad.
West Milford.

Receiving Stream McKinney Run

Mine Name Pennceco Coal Company

Company Name Pennceco Coal Company

Surface Owner Mr. McWhorther (land and remaining coal)

Coal Designation Redstone and Pittsburgh

Elevation 1340'

Area Mined 75 acres

Reserves 6 acres of strip coal

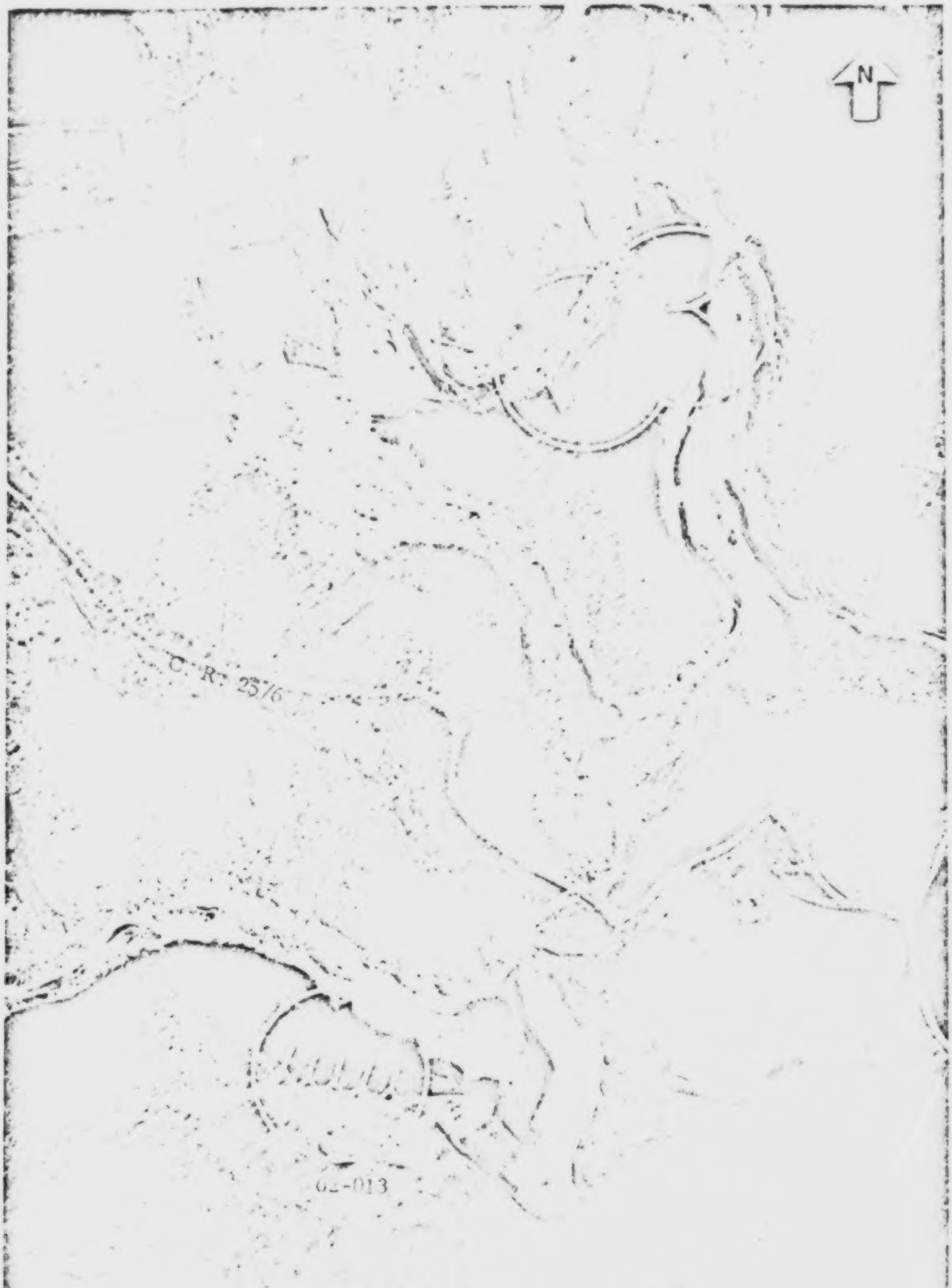
Mining Method Drift

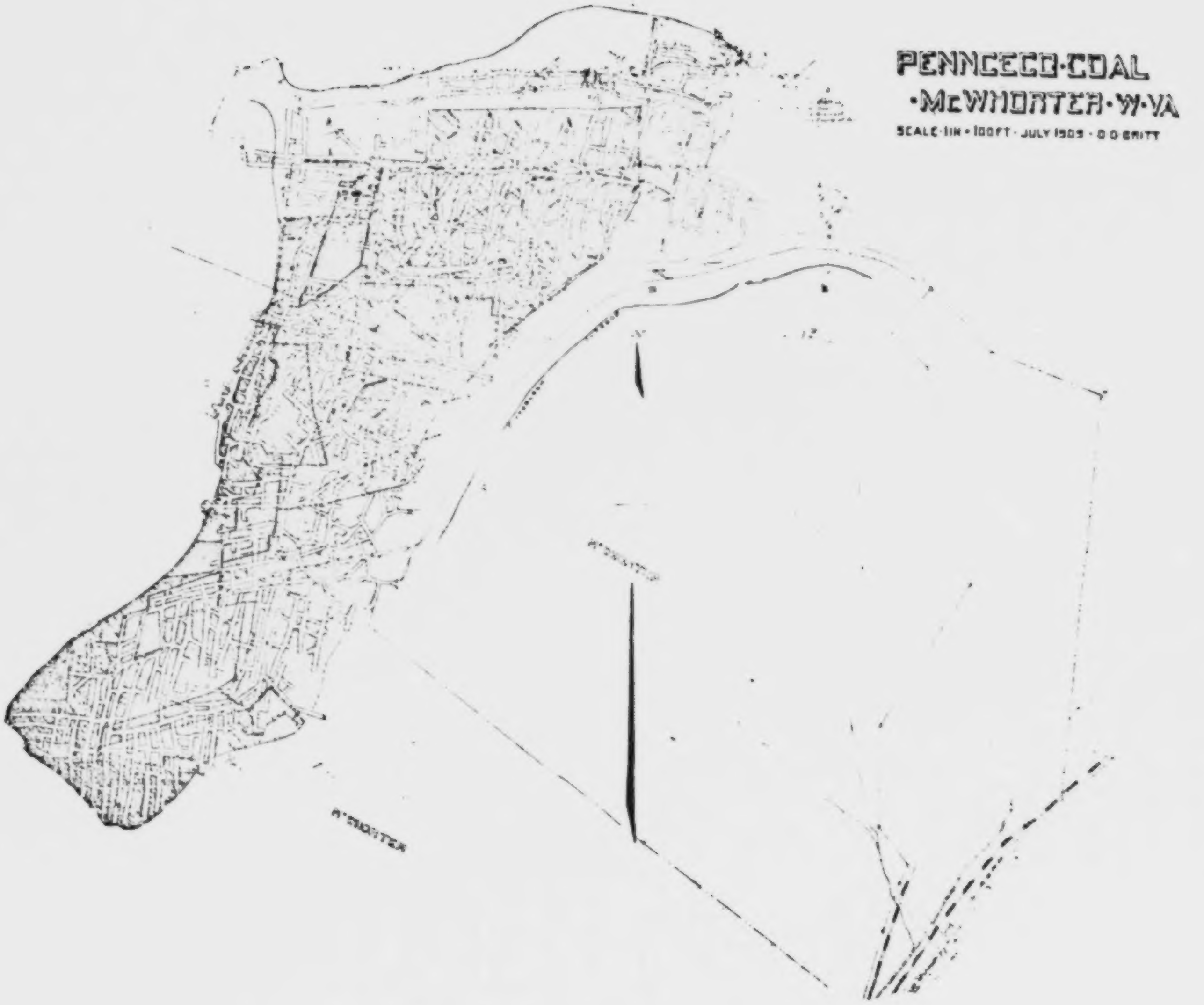
Maximum Overburden 2[illegible]'

Coal Dip North - Rapid

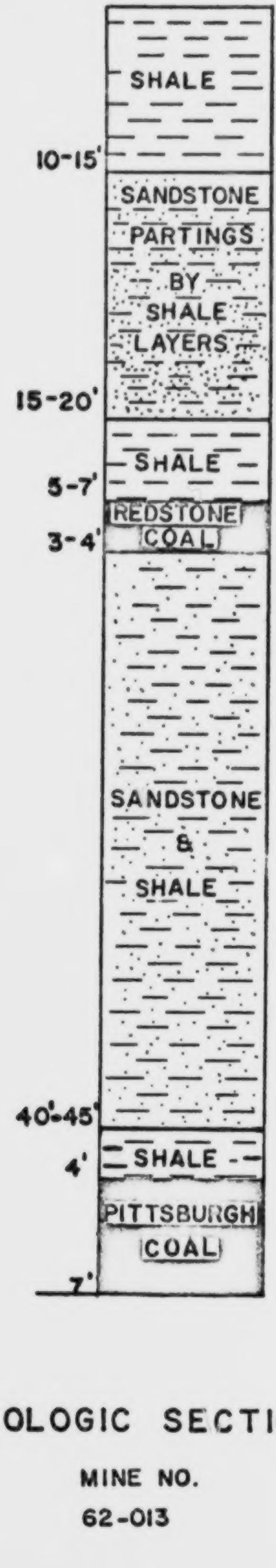
Notes Water is available for remedial work.
Gob is also available.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
9-23-65	2 gpm	3.3	488	15	0	1195	76.3	2	1450	14.0	2145
1-16-67	2.5"	5.5	30	.9	68	1650	103.2	3.2	1326	0	2100
1-26-67	1) 1.7") 2.0"	6.7	0	0	66	1562	289	5.9	1580	1	
	2) 1.3"	2.85	510	6.6	0	1502	98	1.4	2100	29	


N
C. R. 2576
62-013


PENNCECO·COAL
·McWHORTER·W·VA
SCALE·1IN = 100FT · JULY 1909 · O O BRITT
McWHORTER

MINE MAP for MINE NO. 62-013


SHALE
10-15'
SANDSTONE PARTINGS BY SHALE LAYERS
15-20'
SHALE
5-7'
REDSTONE COAL
3-4'
SANDSTONE & SHALE
40'-45'
SHALE
4'
PITTSBURGH COAL
7'

GEOLOGIC SECTION

MINE NO.
62-013

Mine No. 62-054

Helmick Coal Company Mine #1

This site consists of a small isolated island, 50 acres in area, located 5-1/2 miles south of Clarksburg and 1/4 mile west of U.S. Route 19 in Harrison County. The mountain has been stripped around the periphery with the highwalls often exceeding 80 feet in height. Subsequent to stripping and complete augering, a small drift operation known as Helmick Mine No. 1 commenced in the Pittsburgh coal seam. Coal reserves are estimated at 45 acres. A pitmouth and fanway were identified on the north face and a drainway was located on the east side. All openings were closed by highwall slides. With the exception of the area of the mine openings, the strip has been regraded and seeded in pasture. High drainage flows have been recorded at the openings; however, iron and acid loads are negligible. The mine drainage discharges to an unnamed tributary to Sycamore Creek and thence to the West Fork River. The dip of the coal is in the direction of the observed mine drainage. A pipe line right-of-way exists to the top of the hill. No evidence of subsidence was noted. Gob can be found in small quantities and fresh water impoundments are located on the strip.

Potential remedial methods would involve grouting the above noted drift openings by mechanical and chemical processes, and subsequent monitoring and measurement of pressures and water rise in the mine. Auger holes, although covered by backfill, might be plugged by remote methods should they commence to discharge mineralized fluid.

Aerial photographic coverage and a mine map are included.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 62-054 **Location:** **5 1/2 m. S of Clarksburg on Rt. 19 and 1/4 mile West.**

County Harrison Township Union State W. Va.

Coordinates 39° 13.0' N 80° 25.5'W Map Reference NE Weston Quad. West Milford

Receiving Stream Unnamed tributary to Sycamore Creek

Mine Name Helmick Mine #1

Company Name Clyde Bartlett - Coal Owner

Surface Owner C. R. Vance

Coal Designation Pittsburgh (2 openings)

Elevation 1237'

Area Mined 50 acres total

Reserves 48 acres

Mining Method Drift and Strip

Maximum Overburden 263'

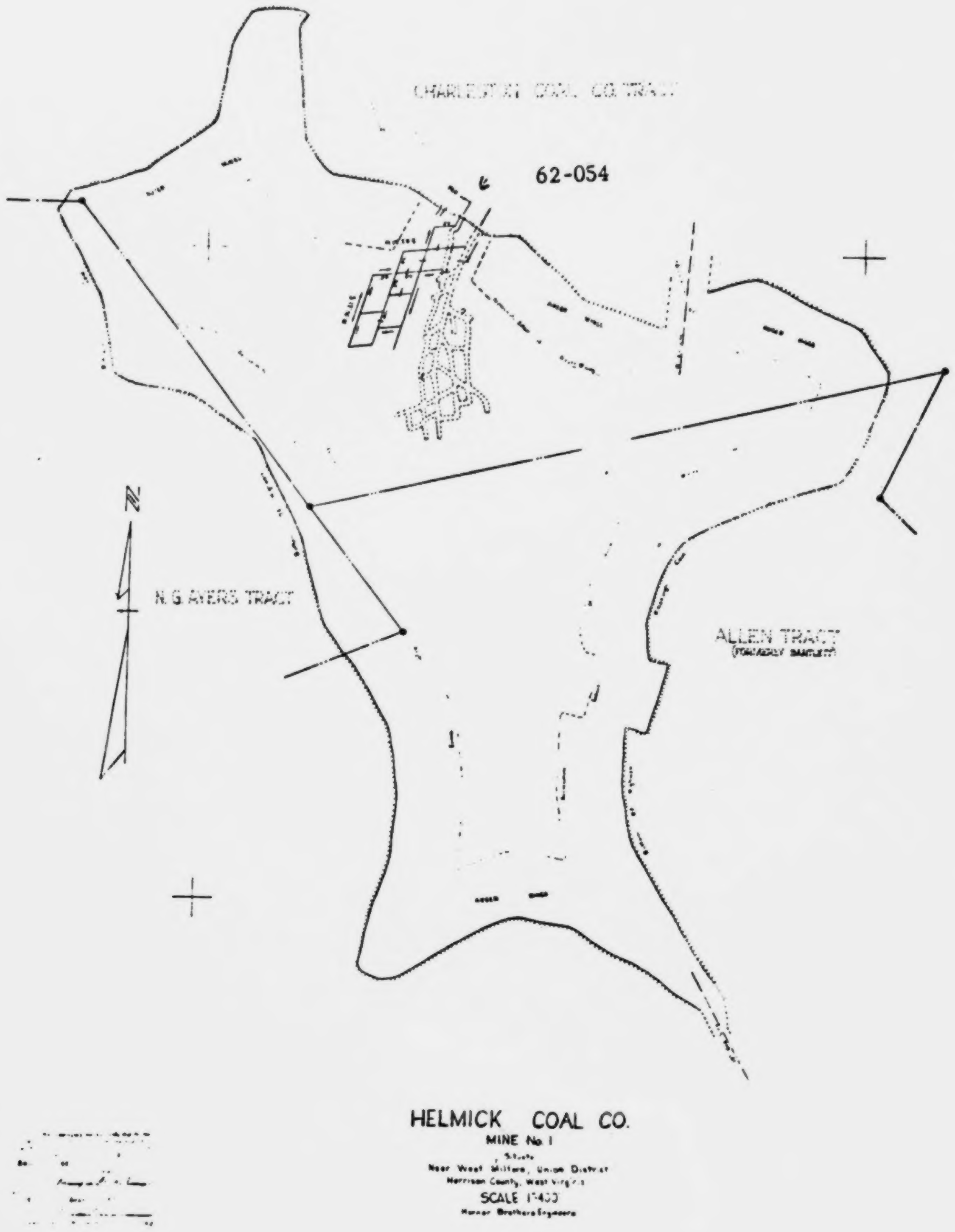
Coal Dip N. E. Fast

Notes Water available for remedial work for several impoundments.

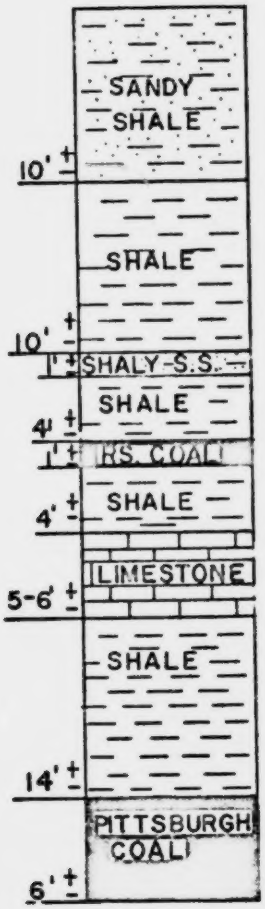
Some gob available - small amount, of not much consequence.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/1	#/day			mg/1	#/day			
10-19-65	2.0 gpm	7.2	207	1	204	1332	10.9	3	1250	0.3	2000
1-16-67	4 "	6.1	10	46	194	1350	2.4	.12	1300	0	2000
1-24-67	12 "	6.8	0	0	185	1268	58	8.4	1150	0	
	10.4 "	7.0	0	0	231	1200	18	2.25	1050	0	
		5.75	0		39	1454	72		1350	0	
		6.5	0		107	1249	44		1100	0	
		6.9	0		34	472	2		400	0	

Reproduced from
best available copy.


CHARLESTON COAL CO. TRACT
62-054
N
N. G. AYERS TRACT
ALLEN TRACT
(FORMERLY BARTLETT)
HELMICK COAL CO.
MINE No. 1
Situate
Near West Milford, Union District
Harrison County, West Virginia
SCALE 1"=400'
Horner Brothers Engineers

MINE MAP for MINE NO. 62-054


SANDY SHALE
10' ±
SHALE
10' ±
1' ± SHALY-S.S.
SHALE
4' ±
1' ± RS. COAL
SHALE
4' ±
LIMESTONE
5-6' ±
SHALE
14' ±
PITTSBURGH COAL
6' ±

GEOLOGIC SECTION

MINE NO.
62-054

Mine No. 62-067

Caputo Mine

This is an isolated strip and drift mine situated about 3.3 miles south and west of Clarksburg, overlooking U.S. Route 19 in Harrison County. This large island has an old and apparently large abandoned drift mine in the Pittsburgh coal seam. With the exception of the several drift openings found on the northeast side, the Pittsburgh coal has been stripped and regraded in large part. The strip is extensive and has large highwalls. Coal rights belong to a Mrs. Snyder. However, no mine map has been located and estimates of unmined and coal reserves are not available at this time.

Three apparent openings were located on the northeast side. Two of these were totally collapsed or sloughed over. Seepage was noted at both. An abandoned 2' diameter fanway was also located. This was dry. The area above these openings is heavily and extensively covered by local subsidence areas in the 12' cover line. No additional subsidence was noted on the hill. Several of the subsidence areas have impounded water in varying amounts. A fourth opening (drainway) was observed farther to the east with a relatively high rate flow (12.5 gpm). This opening was 10' wide, timbered, and clear for 25 feet or more. The entrance was dammed by material to within 1.5 feet of the roof and water was impounded inside. The analyses of all mine water samples taken at these openings indicated no acid loads; however, minerals were present. Mine drainage discharges to an unnamed tributary to the West Fork River.

Mine No. 62-067

The coal seam dips fast to the northeast, accounting for the direction of the observed drainage. However, a fairly large flow was subsequently observed on the south side of the site from beneath the spoil bank below the highwall. This water was also found to have no acid, but some iron.

Gob has been found indiscriminately scattered about the openings in moderate amounts on the northeast side of the site and a small amount of water is impounded on the site. Access to the site is excellent from U.S. Route 19.

Remedial method techniques would include plugging and sealing all identified openings, either remotely by plugging or sealing without disturbing the opening, or by sealing following reopening. Surveillance would be maintained on the south wall drainage, and plugging by means of a grout curtain at the highwall could be considered should remedial measures be warranted at this area. Also, subsidence areas would be grouted and regraded to reduce ground water entry into the mined area. This area also lends itself to the possibility of establishing vertical grout curtains to divert surface flow. The partially open mine might be utilized to preplace aggregate and then subsequently grouted to effect a seal.

Aerial photographic coverage is included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 62-067 **Location: 3.3 m. S of Clarksburg on U.S. 19**

County Harrison Township Union State W. Va.

Coordinates $39^{o}15.2'$ $80^{o}24.5'$ Map Reference W. Milford & Clarksburg S. W. 7 1/2'

Receiving Stream **Unnamed tributary to West Fork River.**

Mine Name Caputo

Company Name Mrs. Nina A. Snider

Surface Owner Mrs. Nina A. Snider & Mason & Allen

Coal Designation Pittsburgh

Elevation 1212'

Area Mined (No map) Unknown

Reserves Unknown

Mining Method Drift and Strip

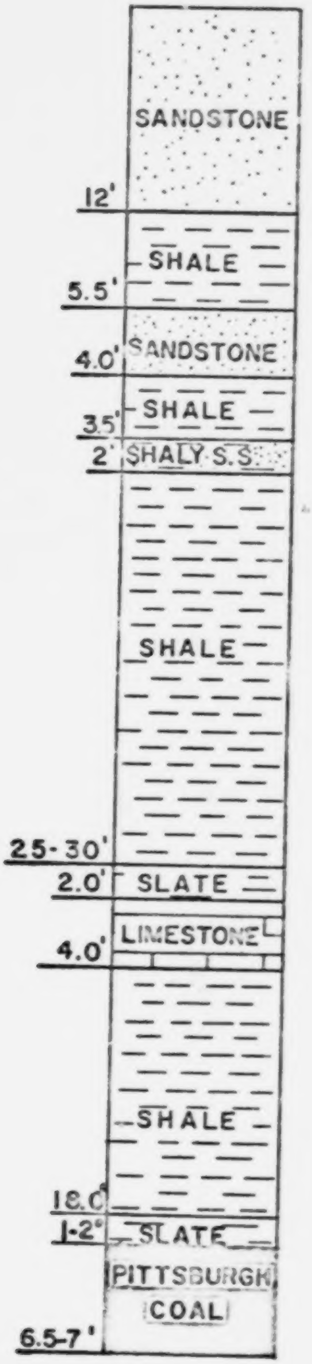
Maximum Overburden 216'

Coal Dip Northeast - Fast

Notes Small amount of water available for remedial work. Small amount of gob present.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
10-27-65	3.2 gpm	7.1	139	1.0	116	1800	37.2	1.0	2060	0	2600
1-16-67	1.5 "	6.0	0	0	90	2150	17	.3	1560	7.0	2002
1-24-67	1.6 "	6.0	0	0	83	1816	97	1.8	1750	0	
	seep	6.75	0	0	86	1772	33	.2	1750	0	
	13.5 "	7.2	0	0	282	1176	20	3.2	1000	0	
3-1-67	13	6.0	0	0	153	1450	31.2	4.88	1144	3.0	2100

N


SANDSTONE
12'
SHALE
5.5'
SANDSTONE
4.0'
SHALE
3.5'
SHALY S.S.
2'
SHALE
25-30'
SLATE
2.0'
LIMESTONE
4.0'
SHALE
18.0'
SLATE
1-2'
PITTSBURGH
COAL
6.5-7'

GEOLOGIC SECTION

MINE NO.
62-067

Mines No. 64-014, 64-016 and 64-017

Sewell-Pocahontas Coal Company - Dolan Mine

This is an isolated drift mine complex of some 60 acres which had been operated by the Sewell-Pocahontas Coal Company, and is located one mile south of Clarksburg on U.S. Route 19 in Harrison County. Drifts are located in the Pittsburgh coal seam and openings have been identified as Mines No. 64-014 and 64-017. Where the mine site has been stripped around the periphery of the mountain, local subsidence has been noted above several of the openings. An 8-inch gas pipe line traversing the site may be abandoned. A total of five openings have been located on the north face, all of which are draining. A single opening (Mine No. 64-014) is located at the west side of the north face and a flow of 2 gpm was recorded. Three openings have been identified with Mine No. 64-017 midway on the north face and flows of 26 gpm to 32 gpm have been recorded at these openings. A single opening (Mine No. 64-016) is located at the eastern end of the north face and an estimated 10 gpm flow was observed. The dip of the coal is fast to the northeast, supporting the mine drainage observations. Mine drainage discharges to Davisson Run and thence to the West Fork River.

A small amount of water and gob are available on site for remedial work. Much of the gob has been graded over. Water is found in small strip impoundments. A partial mine map has been found for the site and based on this, reserves of Pittsburgh coal are estimated at 12 acres. Access to the site is good, although some work would be required for on-site haulroads.

Mines No. 64-014, 64-016 and 64-017

Remedial methods applications would include plugging and sealing of all openings, treatment of local subsidence areas over the mine openings, and possible exploratory and remote placement techniques.

Early remedial methods application to this complex would provide immediate benefits to the local environment which includes the Clarksburg Sunnycroft Country Club. The southwest side has been stripped, as mentioned, permitting visual observation and monitoring of fluid discharge should normal ground-water level be re-established.

Aerial photographic coverage and a partial mine map are included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 64-014

County Harrison Township Clark State W. Va.

Coordinates 39°15.5' N 80° 23.9'W Map Reference Wolf Summit 7 1/2'

Receiving Stream Davisson Run

Mine Name Dolan Mine

Company Name Sewell-Pocahontas Coal Co.

Surface Owner James Dolan and William Rector Heirs

Coal Designation Pittsburgh

Elevation 1212'

Area Mined 48 acres

Reserves 12 acres

Mining Method Drift (abd) and Strip

Maximum Overburden 226'

Coal Dip Northeast - Fast

Notes Small amount of water and gob available for remedial work.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al.	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
4-4-66	.8 gpm	6.3	0	0	198	1817	59.5	.57	1531	0	2590
3-22-67	2 "	6.3	0	0	229	1640	33.6	.81	1352	21.4	2120

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 64-016

County Harrison Township Clark State W. Va.

Coordinates 39°15.5' N 80°23.5' W Map Reference Wolf Summit 7 1/2'

Receiving Stream Davisson Run

Mine Name Dolan Mine

Company Name Sewell-Pocahontas Coal Co.

Surface Owner James Dolan

Coal Designation Pittsburgh

Elevation 1250'

Area Mined 48 acres

Reserves 12 acres

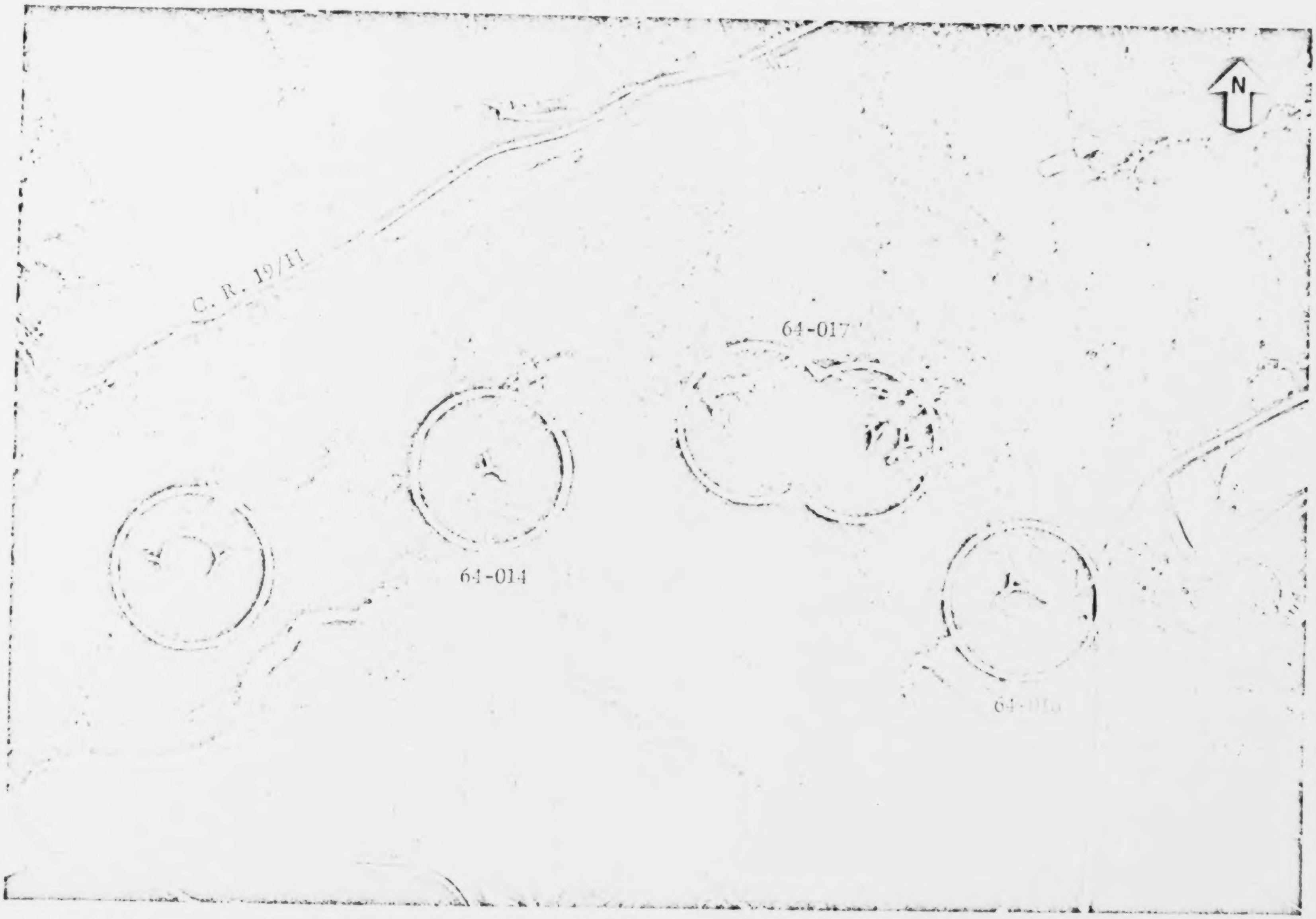
Mining Method Drift (abd) and Strip

Maximum Overburden 226'

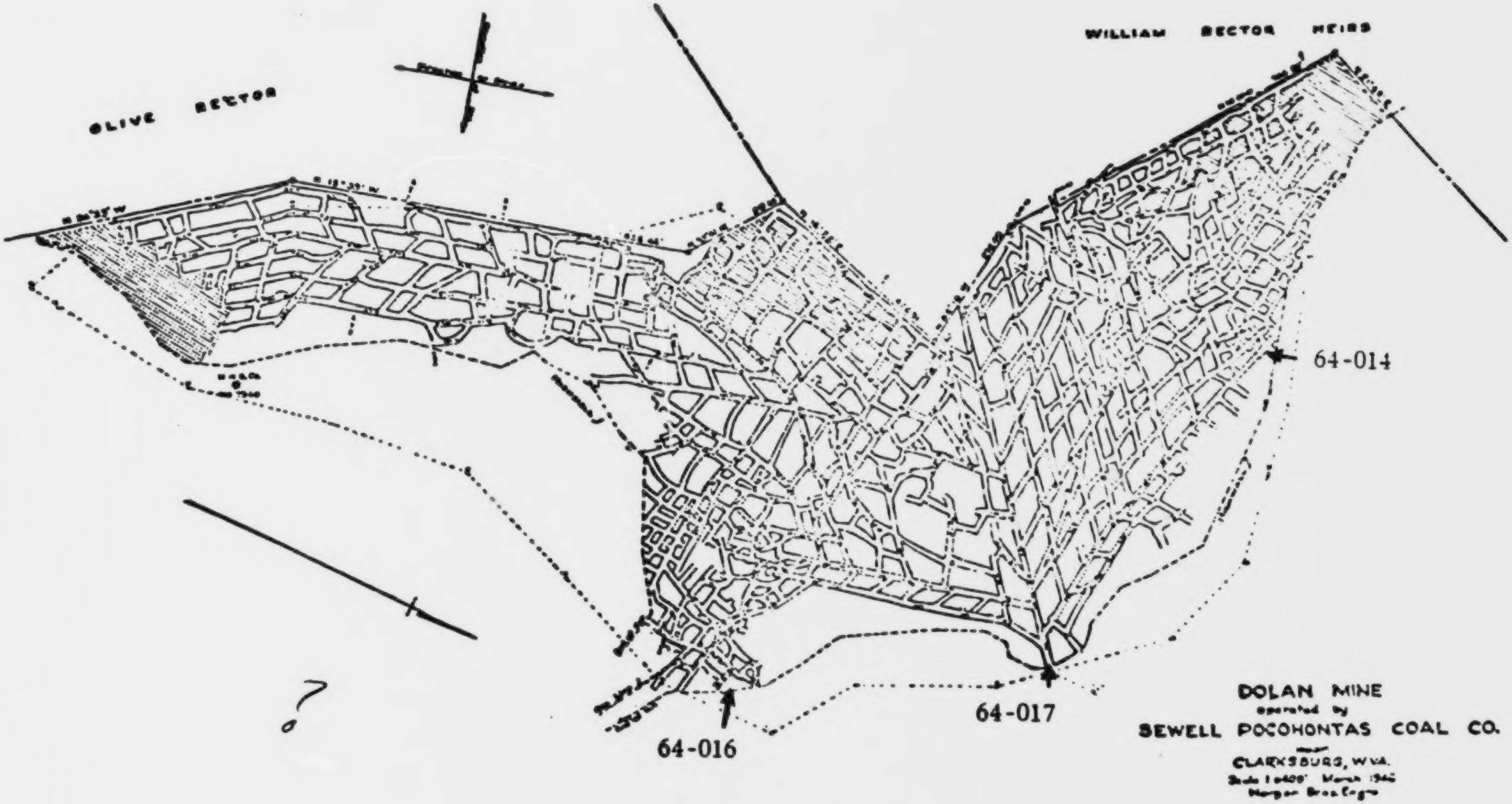
Coal Dip Northeast - Fast

Notes Small amount of gob and water available for remedial work.

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
1-27-66	3 gpm	5.0	106	3.83	423	1960	119	4.3	1640	0	2200
3-22-67	10 gpm	6.4	0	0	204	1520	9.8	1.18	1430	22.0	2218
3-28-67		6.0	10	.12	143	1740	69.6	8.38	1924	13.4	2500

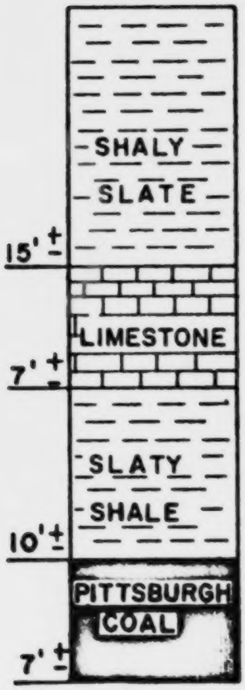


N
C. R. 19/11
64-017
64-014


OLIVE RECTOR
WILLIAM RECTOR HEIRS
64-014
64-016
64-017
DOLAN MINE
operated by
SEWELL POCOHONTAS COAL CO.
near
CLARKSBURG, W.VA.
Scale 1"=400' March 1940
Morgan Bros. Engrs

MINE MAP for MINES NO. 64-014, 64-016 and 64-017

Ronald D. Hill, Chief
Mine Drainage Pollution Control Activities
4676 Columbia Parkway
Cincinnati, Ohio 45226


SHALY
SLATE
15' ±
LIMESTONE
7' ±
SLATY
SHALE
10' ±
PITTSBURGH
COAL
7' ±

GEOLOGIC SECTION

MINE NO.
64-014,016,
017

Mine No. 64-015

This abandoned Pittsburgh drift mine is located within Strip Mine No. 64-013 and drains into Davisson Run within the Upper West Fork Sub-basin. This island, consisting of approximately 10 acres, was found to contain two openings which were draining but have been closed by subsidence. Grading of the strip into the highwall has caused water impoundments against the highwall face. This property has been separated from the area containing Mines No. 64-014, 64-016 and 64-017 by the stripping operation.

Indications are that the coal in this mine has been removed to such an extent that no further entry is anticipated. No mine map is available as yet, although a search is still continuing. The coal on this property is dipping to the northeast, which substantiates the drainage pattern. A total of 9.5 gpm has been measured draining from the impoundments. Although acid is low, mineralization would suggest remedial measures be taken. The two openings might be excavated and plugged by means of Expendable Grout Retainers and an attempt be made to seal fissures permitting entry of water from above the mined area with curtain type grouting. The relatively small area involved would suggest it might well be considered a pilot project. Its physical characteristics would permit the possibility of attempting several mine opening techniques, such as hydraulic jetting, augering, etc., and the subsequent utilization of various remedial measures.

Again, as in Mines No. 64-014, 64-016 and 64-017, successful completion of remedial work at this mine would create good public relations because of this mine's close proximity to Clarksburg and recreational areas.

No mine map is available as yet, but aerial photographic coverage is included herein.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 64-015

County Harrison Township Clark State W. Va.

Coordinates 39°15.5' N 80°24.3' W Map Reference Wolf Summit 7 1/2'

Receiving Stream Davisson Run

Mine Name Muncy Mine

Company Name Unknown

Surface Owner and Coal Owner: Mrs. Muncy - Mr. Frank Young, Administrator

Coal Designation Pittsburgh

Elevation 1260'

Area Mined Estimated - 90%

Reserves Estimated - 10%

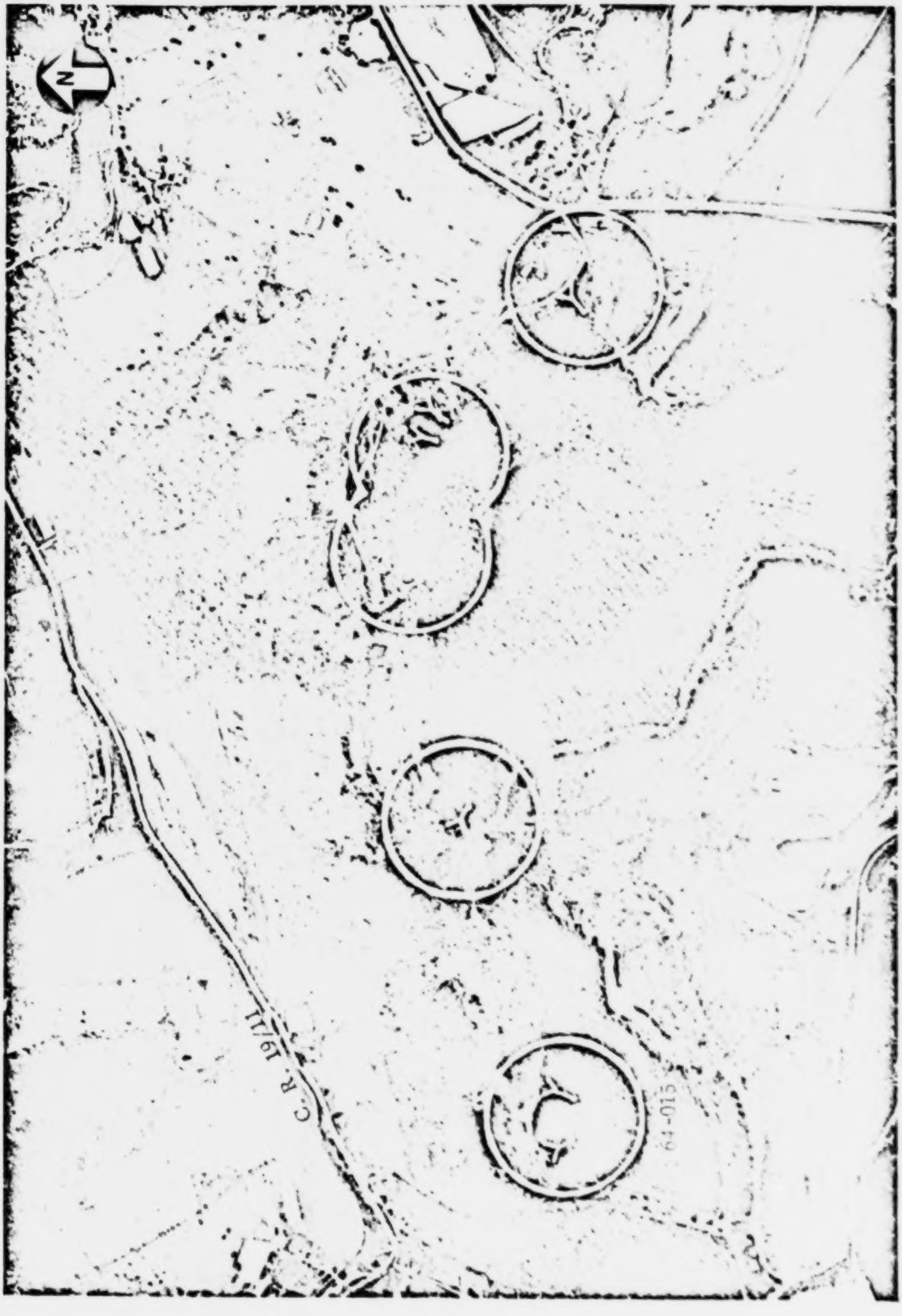
Mining Method Drift (abd)

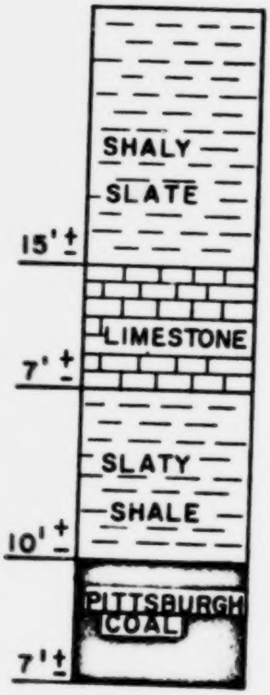
Maximum Overburden

Coal Dip Northeast - Moderate

Notes

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.	
	type ground		mg/l	#/day			mg/l	#/day				
1-18-66	Dry											
3-28-67	7 gpm	2.9	980	82.5	0	1610	234	19.7	2496	56	2642	#1
	2.5 "	2.7	1600	48.4	0	1600	372	11.2	3016	302	3100	# 2


N
C. R. 19/11
64-015


SHALY
SLATE
15' ±
LIMESTONE
7' ±
SLATY
SHALE
10' ±
PITTSBURGH
COAL
7' ±

GEOLOGIC SECTION

MINE NO.
64-015

Mines No. 64-018 and 64-020

These mines are contained within an island of approximately 80 acres, which is surrounded by Strip Mine No. 64-013. This island also contains a dry drift opening, Mine No. 64-019. The strip area has been recently regraded covering much of the Pittsburgh coal. This regrading has added strength to the highwall should plugging operations be employed.

This island has been drifted to an extent that no further deep mining is anticipated. No mine maps have been secured as yet, although a continuing search is being conducted.

It is suggested this complex be retained for possible remedial action.

An example of subsurface mineralized mine drainage source location and abatement might be demonstrated at this site, since water is draining through the reclaimed stripped area. The drift opening could be plugged and any surface subsidence could be sealed to prevent further entry of drainage into the mine. The close proximity of this mine to the Clarksburg area would be conducive to consideration for remedial measures.

No mine map is available as yet, and no aerial photographic coverage of any consequence has been located. The photography that is available is old and, due to recent stripping operations, some of which are still continuing, is considered to be outdated.

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 64-018

County Harrison   Township Clark   State W. Va.

Coordinates 39°16.4' N 80°25.3' W   Map Reference Wolf Summit 7 1/2'

Receiving Stream Davisson Run

Mine Name Clifford Davis Mine

Company Name Clifford Davis

Surface Owner and Coal Owner: Clifford Davis, Clarksburg, W. Va.

Coal Designation Pittsburgh

Elevation 1260'

Area Mined Estimated 80%

Reserves Estimated 20%

Mining Method Drift and Strip

Maximum Overburden 220'

Coal Dip East - Fast

Notes

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
3-28-67	7.5 gpm	4.7	280	25.2	7	1600	102	9.2	1768	46	2320
	10 "	5.8	10	1.2	77	1600	51.6	6.2	1404	51.8	2220

DATA LIST

WEST FORK RIVER BASIN

MONONGAHELA RIVER MINE DRAINAGE PROJECT

Mine Number 64-020

County Harrison Township Clark State W. Va.

Coordinates 39°16.4'N 80°25.2'W Map Reference Wolf Summit 7 1/2'

Receiving Stream Davisson Run

Mine Name Clifford Davis Mine

Company Name Clifford Davis

Surface Owner and Coal Owner: Clifford Davis, Clarksburg, W. Va.

Coal Designation Pittsburgh

Elevation 1260'

Area Mined Estimated 80%

Reserves Estimated 20%

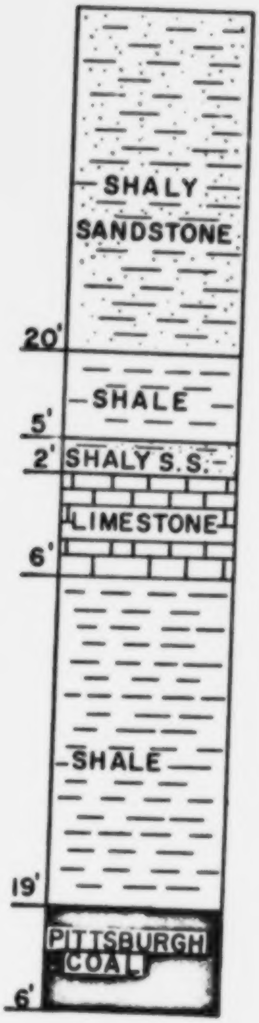
Mining Method Drift and Strip

Maximum Overburden 220'

Coal Dip East - Fast

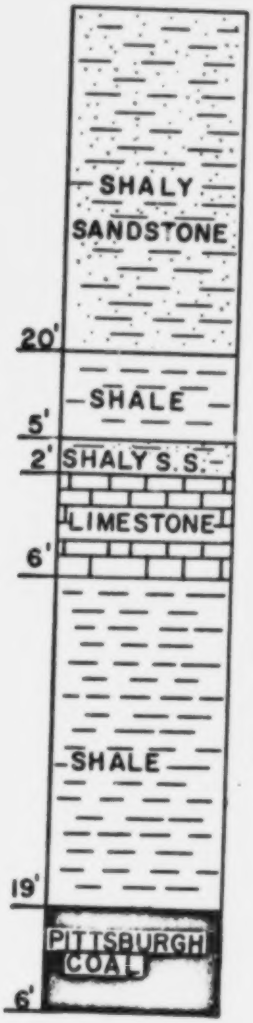
Notes

Date	Flow	pH	Acid		Alka	Hard	Iron		SO4	Al	Cond.
	type ground		mg/l	#/day			mg/l	#/day			
1-18-66	1	6.3	0	0	229	1425	44.3	.5	610	117.3	2214
3-28-67	12 gpm	7.5	0	0	301	1600	2.4	.2	1222	36.4	2120


SHALY SANDSTONE
20'
SHALE
5'
2'
SHALY S.S.
LIMESTONE
6'
SHALE
19'
PITTSBURGH COAL
6'

GEOLOGIC SECTION

MINE NO.
64-018


SHALY SANDSTONE
20'
SHALE
5'
2'
SHALY S.S.
LIMESTONE
6'
SHALE
19'
PITTSBURGH COAL
6'

GEOLOGIC SECTION

MINE NO.
64-020

FIELD TRIALS - REMEDIAL METHOD APPLICATION

The testing and trial of one of the remedial methods developed to date in the Study for the abatement of continual and widespread pollution from mine drainage in the water courses of the Sub-basin was undertaken in conjunction with the selection of twenty mine sites previously described.

This followed the mine site surveys, exploration, inventory and water sampling and analyses and the design of specific remedial methods based on the application of grouting techniques as set forth in the Part I Report for the Contract.

In order to test and try the application of a method, both the site and the remedial method had to be considered. After a thorough review of those conditions and causes for major sources of mine drainage pollution in the Sub-basin, it was apparent that ground-water which had percolated to the abandoned drift mine workings and was subsequently discharged to the surface at the mine openings and directly to the minor tributaries, streams and rivers in the area is a major contributor to the single problem of polluted watercourses in the Sub-basin.

Therefore, a method whereby the direct discharge of flow of mine drainage could be stopped was selected. This involved the economical and rapid placement of permanent seals or plugs by the use of Expendable Grout Retainers which could be remotely placed in partially or completely opened but abandoned drift mine entrances.

Essentially this procedure represents a continuation of the aims of much earlier sealing practices instituted throughout the area in the 1930's. However, the proposed method indicates a more lasting seal with positive but remote replacement.

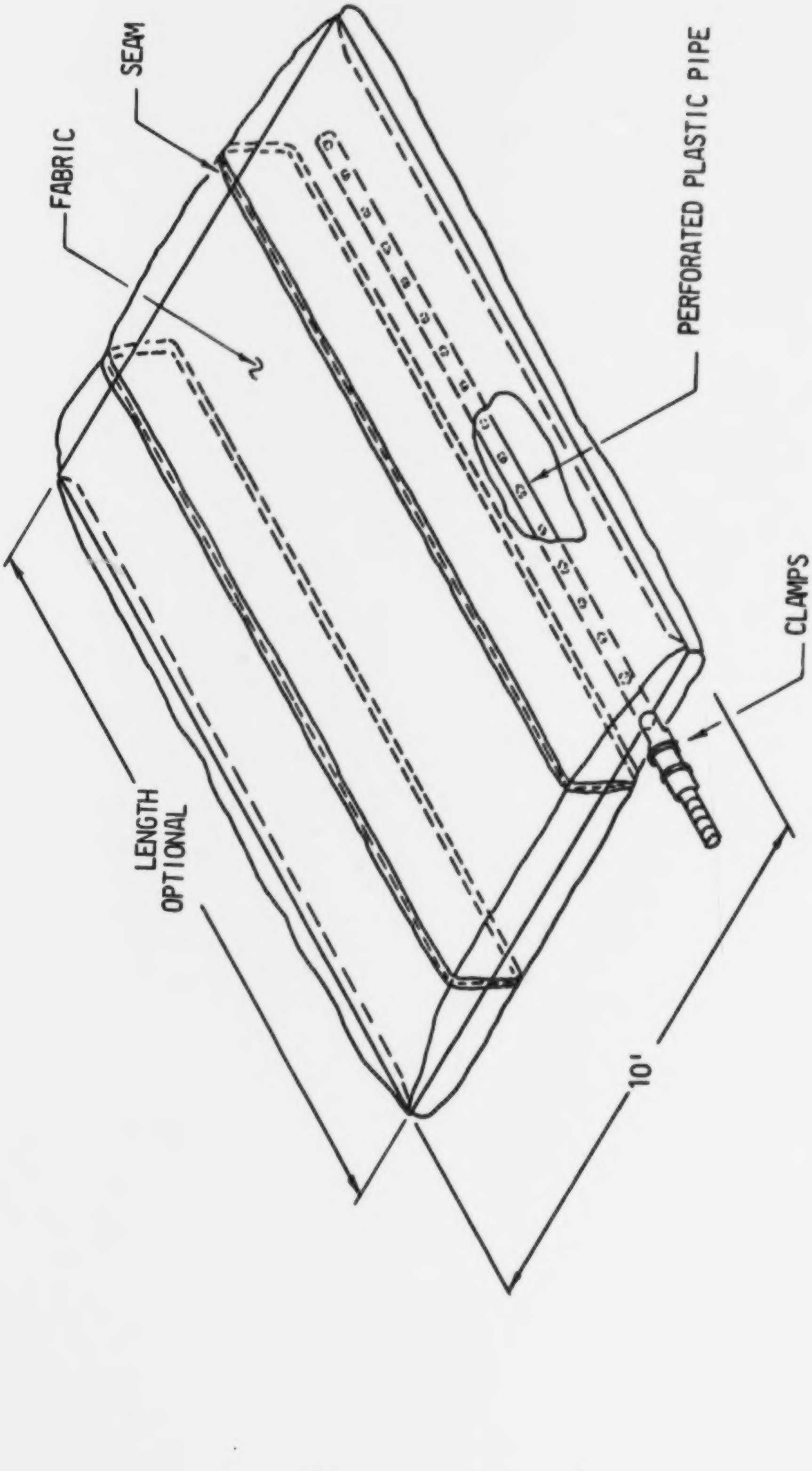
This method is not this

Similarly, other methods which have been developed in this Study could be utilized. However, the Expendable Grout Retainer was selected at this time to test both the initial cost and applicability under prevailing conditions and because of its noted ability to form a bulkhead under a large number of observed conditions. Alternate methods for inhibiting mineral formation in the mine voids and for excluding ground-water and drainage from the mined areas are contingent to a large extent on locating and measuring voids in and subsidence areas above the coal seams. The ability to measure and map these areas with sufficient accuracy to insure the proper and feasible use of the latter methods has not been demonstrated to date. Reliance cannot be placed on existing coal mine maps which are largely out of date since many of the mines have been subsequently drifted, pillared and stripped. Often these same maps were not initially drawn from sufficiently accurate surveys to insure entrance or penetration from the surface above the mine or at the coal faces. Therefore, certain methods were not considered further for application to the field trial.

what do they mean?

The development of the Expendable Grout Retainers was initiated with the objective of producing a permanent, low cost closure device for irregularly shaped, random sized drift mine openings. While much progress toward this goal has been made, it is believed that many improvements to this device can be made and that the majority of its capabilities, limitations and applications remain to be discovered. Figured for more money?

The device, as it now exists, is shown in Figure 1 as a fabric retainer equipped with a fabric spout through which is inserted and clamped a perforated


FABRIC
SEAM
PERFORATED PLASTIC PIPE
LENGTH OPTIONAL
CLAMPS
10'

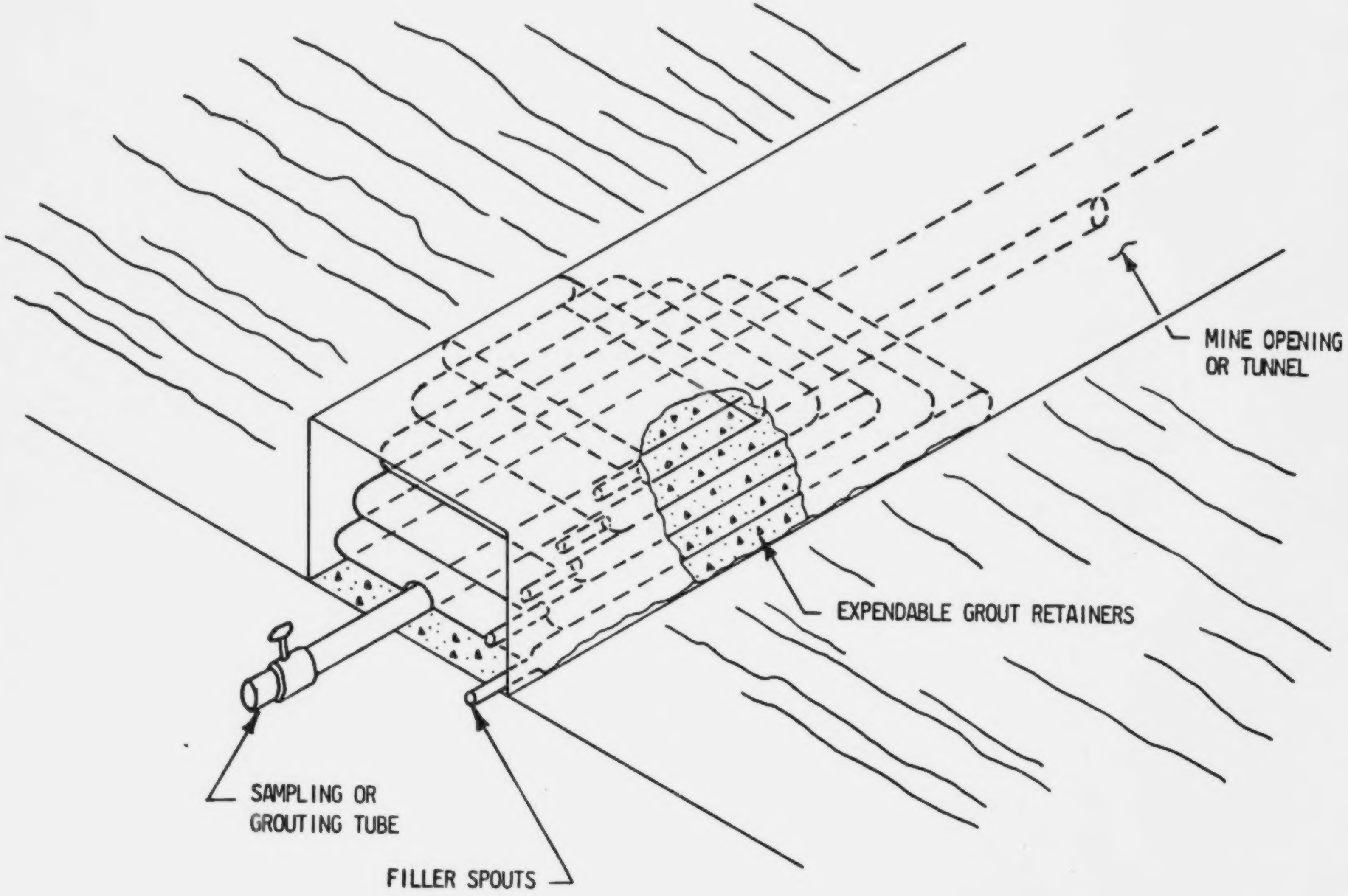
EXPENDABLE GROUT RETAINER

Figure 1

pipe. The purpose of the perforated pipe is to more evenly distribute the grout material in the retainer as the retainer is unfolded in the mine opening.

The proposed use of the retainer is illustrated in Figure 2. As illustrated, a number of the retainers would be required for closing a nominal size opening. Prior to placement of the retainer, pipes would be placed remotely in the mine opening floor for the purpose of possible subsequent grouting, sampling or observation purposes. The first retainer would be placed in the opening floor as shown in Figure 2 and first filled with air to cause the retainer to expand to its maximum size. This would allow repositioning the retainer if necessary. The necessary grout material to give an approximate 1-foot high fill would then be pumped into the retainer. After an initial set had occurred in the grout material, a second retainer would be placed atop the first and filled with the same grout material to give a 2-foot fill height. This operation of placing and filling the retainers would be repeated until the final retainer would make contact with and conform to the shape of the mine opening roof. Where a permeable retainer material is used, seepage of the slurry through the retainer material will effect a bond between the retainer and the mine walls and roof. In cases where a non-permeable retainer is used, cement slurry may be sprayed on the walls and roof to provide a bond.

As shown in Figure 2, each successive retainer placed is shorter than the preceding retainer so as to reduce the tendency of the upper retainer to displace in a direction either forward or rearward from the desired placement location during the initial filling operation.


MINE OPENING
OR TUNNEL
EXPENDABLE GROUT RETAINERS
SAMPLING OR
GROUTING TUBE
FILLER SPOUTS

EXPENDABLE GROUT RETAINER APPLICATION

Figure 2

Research and Development

1. Design Objectives

The specific objectives set forth when the development of this device was initiated were as follows:

(a) The retainer could be placed in a remote location.

(b) The retainer would be fabricated of a material that would allow the formation of a bond between the contained grout and the mine walls.

(c) The retainer would conform to irregular surfaces such as those encountered in drift mines.

(d) The closure effected by placement of the retainers would be acid and mineral resistant.

(e) The closure would be permanent and of low cost construction.

2. Testing and Evaluation

(a) Test Objectives

(1) To observe the permeability of the retainer fabric as it was filled with grout slurry.

(2) To observe the unfolding ability of the retainer as grout slurry is injected.

(3) To determine the maximum burst pressure of the retainer.

(4) To determine the maximum level area of the top of the retainer when filled with slurry to result in a given overall height.

(5) To determine height of the retainers with a given amount of slurry injected.

(b) Laboratory Test Procedures.

(1) Placement conditions

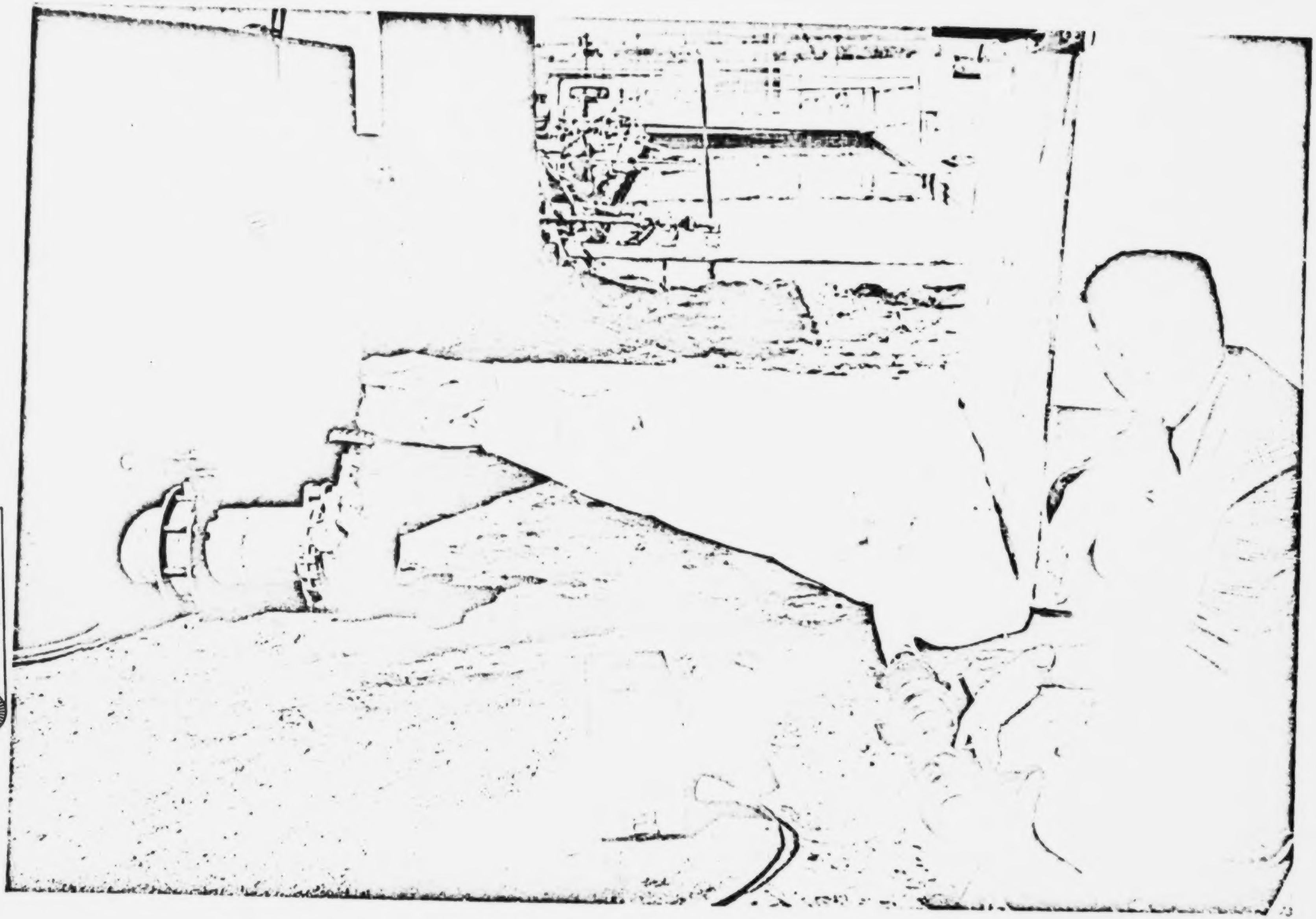
The retainers were placed between two large metal water tanks forming two parallel vertical walls to simulate placement in a mine opening. The retainer was initially placed in the opening in a folded condition and subsequently caused to be unfolded by the internal force of the slurry entering the retainer, as is shown in Figure 3.

(2) Slurry Preparation and Placement.

Cementing material was mixed with water to a desired weight and the grout slurry was pumped into the retainer from a mixing tank by means of a centrifugal pump.

(3) Retainer Height and Slurry Pumping Rate.

The height of the retainer, as it was filled with grout material, was measured and recorded by photographing the retainer and scales marked on the sides of the water tanks as shown on Figure 4.



PLACEMENT OF EXPENDABLE GROUT RETAINER IN SIMULATED MINE OPENING

Figure 3

Reproduced from
best available copy.

FILLING OF EXPENDABLE GROUT RETAINER IN SIMULATED MINE OPENING

Figure 4

(4) Retainer Pressure Measurement and Recording.

A mercury manometer was used to provide a visual indication of the pressure in the retainer, while an air bleed-back pressure sensing device and recorder was used to record as well as indicate the pressure in the retainer.

(5) Other Data Recording Methods.

Still and motion photography was employed to record various data and progress throughout the tests.

(c) Test Data (See Tables 1 and 2).

(d) Test Results.

(1) Maximum burst pressure.

The maximum burst pressure obtained was 2.33 psi in Test 6 on Style "A" retainer made of liquid filter cloth.

(2) Maximum strength of any retainer tested was exhibited in Test 1. This was a Style "A" retainer made of dacron fabric which withstood a pressure of 2.7 psi.

(3) Permeability.

The most satisfactory permeability was exhibited by the retainer tested in Test 6 made of liquid filter cloth.

(4) Unfolding Ability.

All retainers exhibited satisfactory unfolding ability during initial filling. Style "B" retainer appeared more

Table 1

TEST RETAINER MATERIAL SPECIFICATIONS

	(1)	(2)	(3)
Mfg. Designation:	S/101-00	S/302-50	S/702-50
Description:	Cotton Sateen	Nylon Filament	Dacron Filament
Weave:	5H Satin	Plain	3/1 RHT
Thd. Count:	96 x 60	60 x 54	73 x 64
Weight*:	9.7	3.5	5.0
Air Permeability**:	15-20	40-60	10-15
Filament Tensile Strength	275	450	450

	(4)	
Mfg. Designation:	Liquid Filter Cloth Sgl. Fill, Grade "A"	Cotton Duck, Sgl. Fill Grade "B"
Weave:	Oxford	Plain
Thd. Count:	44 x 20	-
Wt./Sq. Yd.:	7.5 oz.	8.0 oz.

* Oz/Sq. Yd.

** CFM/sq. ft. @ 0.5" Differential Water Column

Table 2

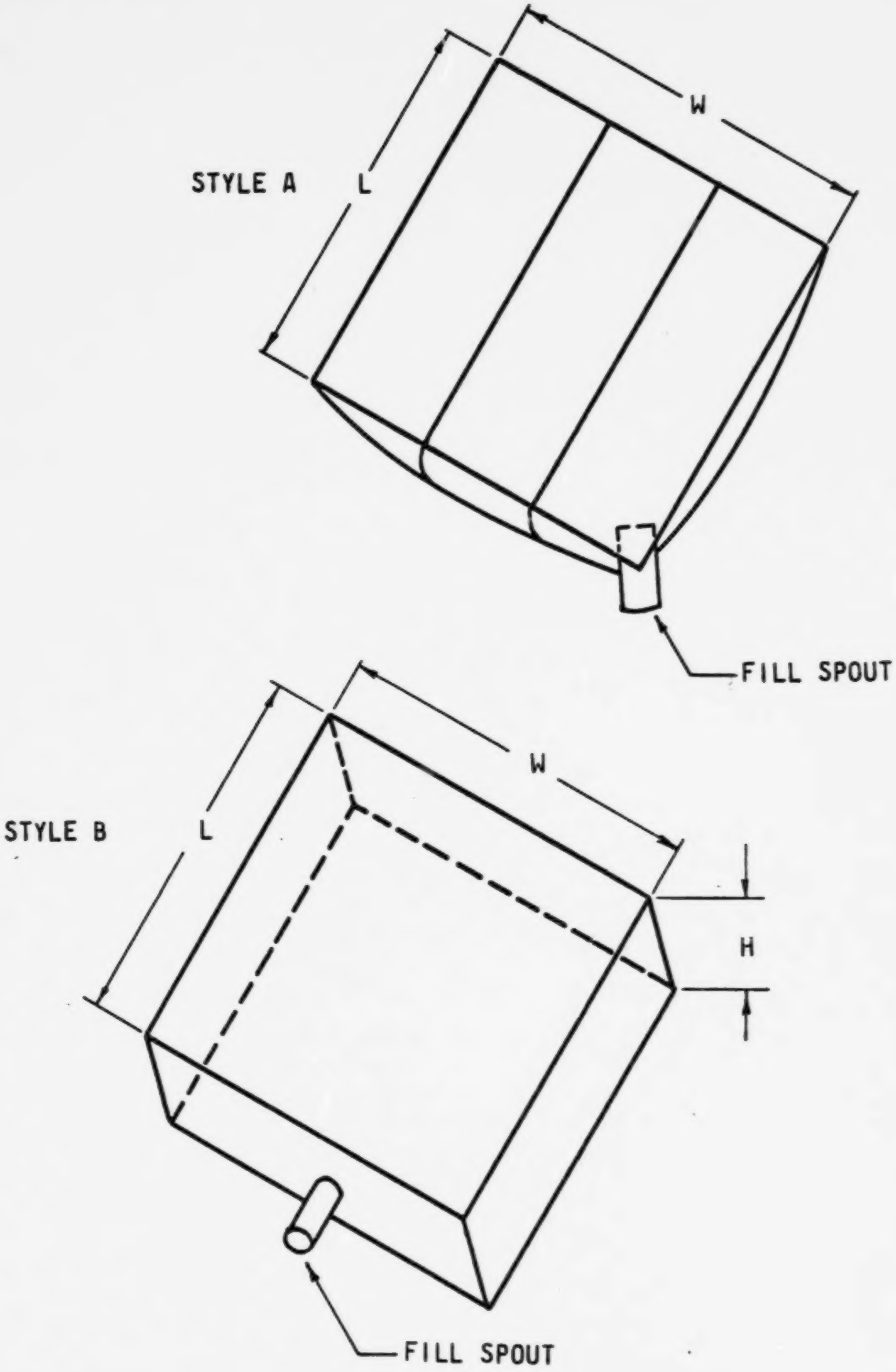
TEST DATA

Test No.	Date	Test Objective **	Retainer Size and Style	Retainer Material	Retainer Cost	Slurry Composition and Weight (lb/gal)	Permeability to Grout	Maximum Pressure (psi)	Total Slurry Injected (gal.)	Maximum Height (Inches)	Longitudinal Level Length (Ft.)	Weight of Retainer After Filling	Remarks
1	3-23-67	1, 2 4, 5	L-10' W-10' H-0 Style A	Dacron S/702-50	$100.00	Cl.B Portland Cement 4% Bentonite 2% $CaCl_2$ 14.5	Poor	2.7	1122	33	N.A.	16, 310#	
2	3-28-67	2, 4	L-10' W-10' H-0 Style A	Sateen S/101-00	50.00 (Est.)	Cl.B Portland Cement 4% Bentonite 2% $CaCl_2$ 14.1	Poor	.49	561	12	N.A.	Not Obtained	
3	3-31-67	2, 4	L-8' W-10' H-0 Style A	Cotton Duck 8 oz.	30.00 (Est.)	Cl.B Portland Cement 4% Bentonite 14.0	Poor	.49	597	14	5' L x 7' W	3, 870#	
4	4-14-67	2, 3	L-10' W-7' H-3' Style B	Nylon S/302-50	60.00	Water 1% Bentonite 1% Cellophane Flake	N.A.	2*	N.A.	38	N.A.	Not Obtained	Rupture Occurred at Seam.
5	4-18-67	2, 3	L-10' W-7' H-3' Style B	Nylon S/302-50	60.00	Cl.B Portland Cement 4% Bentonite 14.15	Poor	Not Recorded	1500	20	N.A.	Not Obtained	Test not completed due to failure of plastic injection pipe
6	4-19-67	2, 3	L-10' W-10' H-0 Style A	Cotton Loose Weave Filter Cloth	30.00 (Approx.)	50-50 Pozmix 2% Bentonite 3% HA-5 14.2	Excellent	2.33*	N.A.	40	N.A.	Not Obtained	Rupture Occurred at Seam

* Indicates burst pressure

** Refer to Sec. B, 2a.

For Retainer Style Description, See Figure 5.


STYLE A
L
W
FILL SPOUT
STYLE B
L
W
H
FILL SPOUT

STYLES OF RETAINERS TESTED

Figure 5

desirable since placement in the center of the mine opening would be less difficult than placement of a Style "A" retainer in either the right or left lower corner of a mine opening.

(5) Slurry Injection Rates.

In one test of a 10' x 10' retainer made of dacron material, the retainer was inflated with water prior to being filled with grout slurry. It was found that, at an injection rate of 100 gpm, the retainer would leak at a rate apparently equal to the injection rate since no further expansion of the retainer was visible.

Throughout all of the tests, it was observed that the highest injection rates that would still permit formation of a filter cake of the slurry solids on the inner surfaces of the retainers were the most desirable. This rate varies depending on the choice of retainer fabrics and should be further investigated prior to extensive application of the retainers in any mine sealing program.

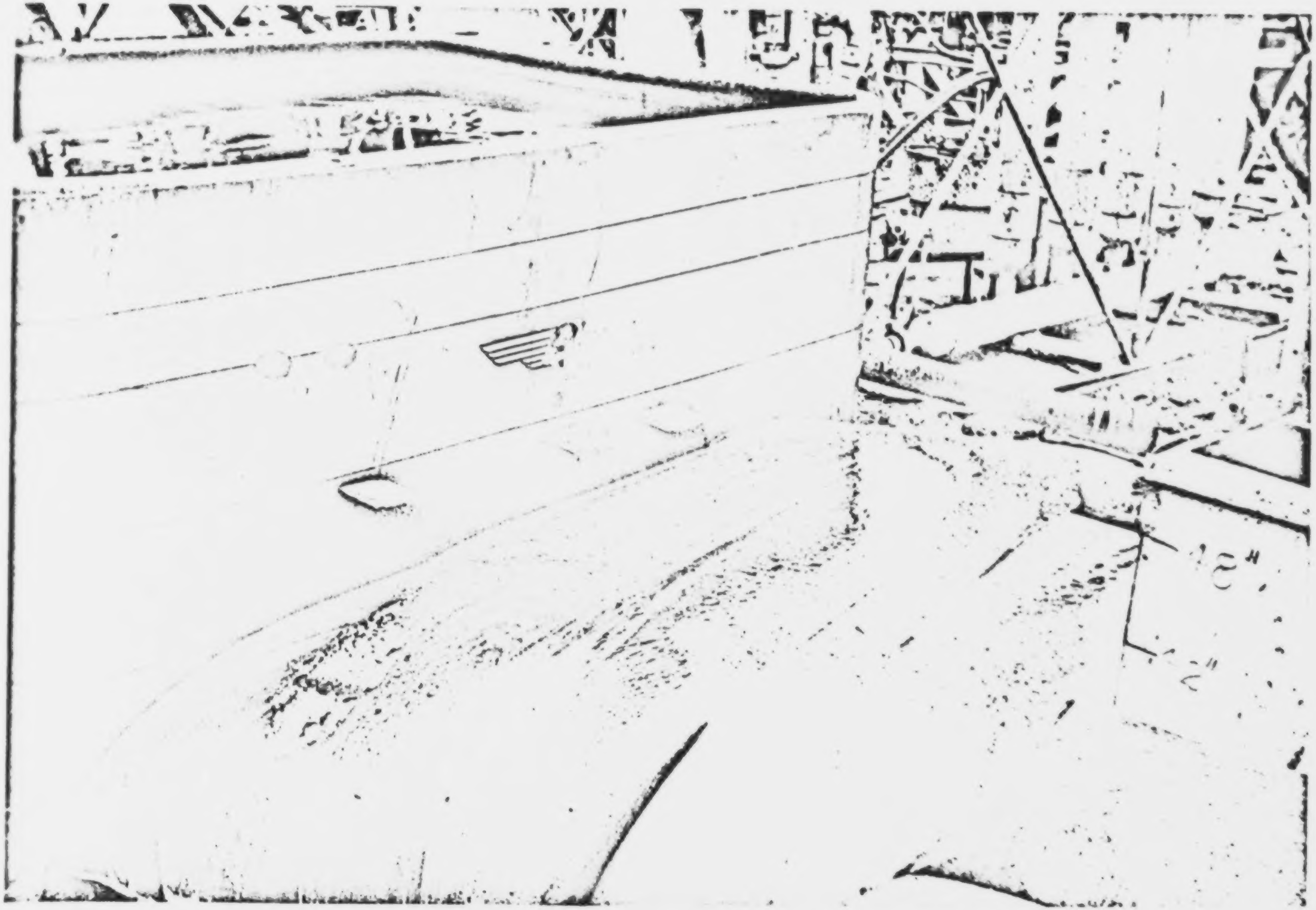
(6) Figure 6 illustrates the ability of the grout filled retainer to conform to an irregular surface. This photograph was made of the retainer utilized in Test 6.

(e) Recommended Development Program.

(1) Structual Design.

(a) Locate seams in low stress areas of retainers.

Figure 6



FILLING OF EXPENDABLE GROUT RETAINER IN SIMULATED MINE OPENING

(b) Locate retainer fill spout in a low stress area.

(c) Investigate use of cemented seams in lieu of sewn seams.

(d) Investigate retainer materials and fabrics further to determine optimum values of strength permeability and economics.

(2) Conduct further investigations of retainers fabricated of high strength and less permeable materials for retainer ends and permeable materials for intervening portion of retainer which would be in contact with mine walls, floors and roofs and other retainers.

(3) Conduct further investigations of the feasibility of constructing a retainer which could be expanded to completely free a mine opening.

(4) Investigate other grouting materials that will expand on setting, thus creating and maintaining the bond at the roof and walls after closure.

(5) Design simple anchor devices to allow setting retainers on drift mine floors where excessive coal dips of floor slopes are encountered.

Based on the selection, with the concurrence of the F.W.P.C.A. Project Officer, of the use of the Expendable Grout Retainers to plug an existing mine opening, a site in the immediate vicinity of Clarksburg, West Virginia was selected. Designated Mine No. 14-042A in the mine surveys and inventory, this location had also been designated as one of those among the twenty sites selected for further study. Data Sheets and a description of the site are therefore set forth under the Section entitled "Selection of Twenty Sites." Choice of this site is described hereinafter, under "Report of Pilot Trial at Mine No. 14-042A."

REPORT OF PILOT TRIAL AT MINE NO. 14-042A

Mine No. 14-042A, designated as Penn Coal Company Annex, is located approximately one mile south of Clarksburg, Harrison County and lies southeast and adjacent to Sunset Memorial Cemetery on State Secondary Route 25. Mr. and Mrs. H. W. Bassel and Mrs. B. M. Fidler are the surface owners, and the Virginia Allen Corporation - Petitto Brothers is the coal owner.

Mine No. 14-042A was selected with the concurrence of the F.W.P.C.A. Project Officer as the site to initially test a remedial method design and application for mine drainage abatement. Several mines were considered because of their physical characteristics and similarities to conditions existing in the Upper West Fork River Sub-basin. Among these were:

Mine No. 62-014A - A small island near McWhorter having augered holes; was stripped in both the Redstone and Pittsburgh coal seams.

Mine No. 62-015 - A Redstone drift mine which was also stripped and augered in both the Redstone and Pittsburgh coal seams.

The above mines were eliminated because further stripping operations would not permit sufficient monitoring time.

Mine No. 40-070 - A small neck, drift mined in the Pittsburgh seam, and part of the mine complex on the east side of Browns Creek. This mine was eliminated because of the absence of mine drainage.

Mine No. 40-058 - Lacked mine drainage and was considered to be too extensive for a trial operation of this type.

Mine No. 40-016 - Had good possibilities because of Pittsburgh and Redstone drift mining, strip mining, and augering. Considered too large for an operation of this type. Also, it had characteristics desirable for selection as one of the final three sites.

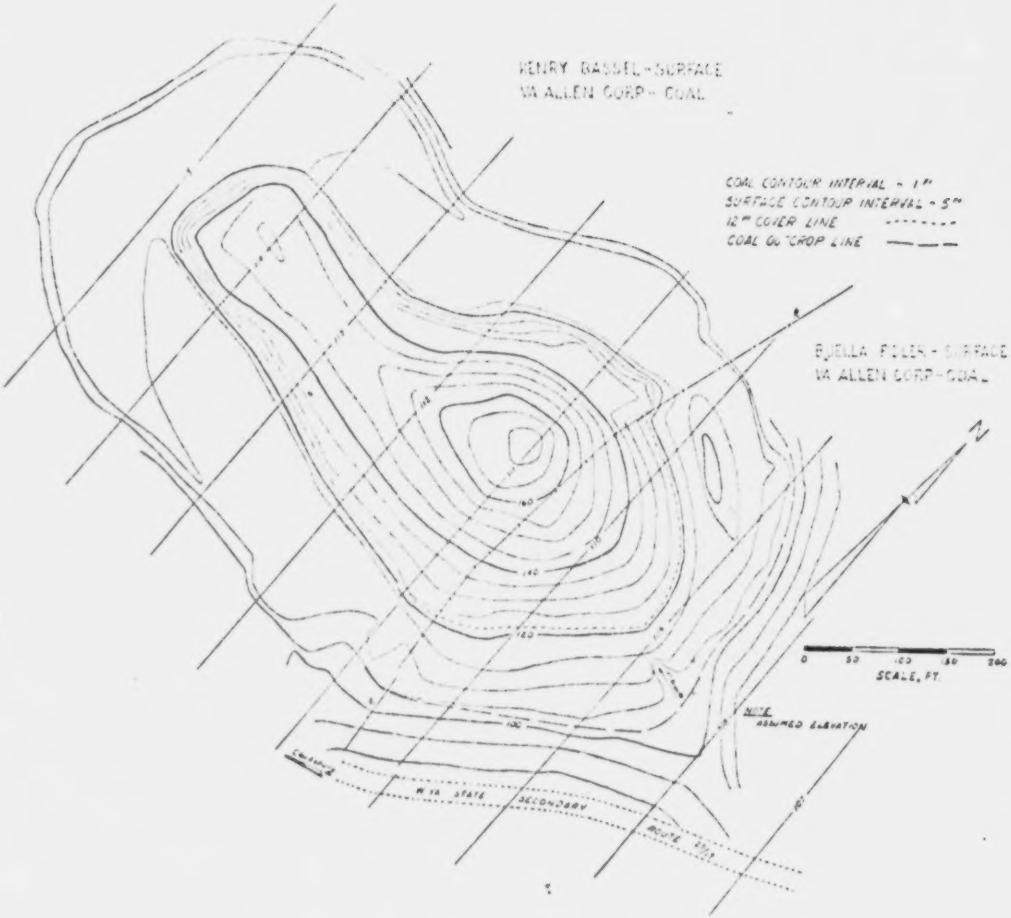
Mine No. 64-015 - Was considered but eliminated in favor of Mine No. 14-042A.

Mine No. 14-042A is a small, isolated drift and partially stripped mine encompassing a total area of 5 acres. It has been extensively mined and negligible coal reserves remain. Flows ranging from 1 gpm. to 30 gpm. have been measured. The flows were consistently of low pH value and were highly mineralized.

The coal dips rapidly to the east, substantiating the observed direction of mine drainage at the pitmouth. Heavy subsidence was noted, especially along the 12-foot cover line and, in addition, was noted over the entire area. Roof conditions within this mine were reported and noted to be especially good, although several cross cuts and haulways have collapsed. These falls were correlated with the subsidence areas noted above the mine.

Its remote location, small area, and the fact that its partial stripping would aid future monitoring procedures contributed to those factors considered favorable for the selection of this site as a trial site.

The trial was originally scheduled for April 25, 1967. Access rights to the site including legal permission from both property and coal owners were secured and reimbursement was made on April 18, 1967. A local construction company was retained to prepare the site, and civil engineers were engaged to survey and to complete topographic mapping of the site, including contours of the Pittsburgh coal, which is shown on PLATE III.


HENRY BASSEL - SURFACE
VA ALLEN CORP - COAL
COAL CONTOUR INTERVAL - 1"
SURFACE CONTOUR INTERVAL - 5"
12" COVER LINE
COAL OUTCROP LINE
BUELLA FOLEY - SURFACE
VA ALLEN CORP - COAL
N
160
140
120
100
0
50
100
150
200
SCALE, FT.
NOTE
ASSUMED ELEVATION
W VA STATE SECONDARY ROUTE

TOPOGRAPHIC MAP
PORTION OF PENN COAL COMPANY MINE

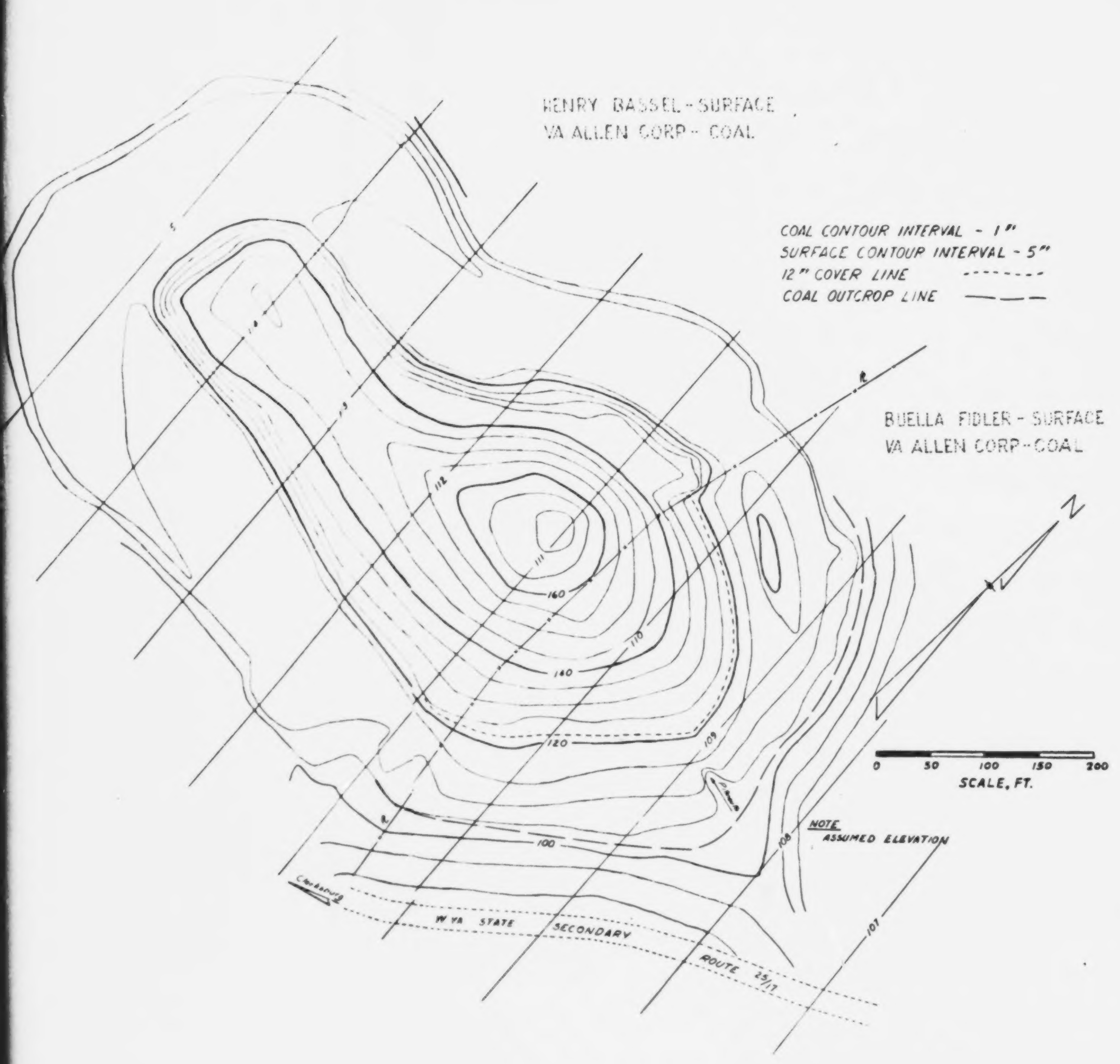
MINE NO. 14-042 A

HARRISON COUNTY, WEST VIRGINIA

XXXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXXXX

159-a

PLATE III


HENRY BASSEL - SURFACE
VA ALLEN CORP - COAL
COAL CONTOUR INTERVAL - 1"
SURFACE CONTOUR INTERVAL - 5"
12" COVER LINE
COAL OUTCROP LINE
BUELLA FIDLER - SURFACE
VA ALLEN CORP - COAL
N
112
111
160
140
110
120
109
100
108
107
0
50
100
150
200
SCALE, FT.
NOTE
ASSUMED ELEVATION
Clarksburg
W VA STATE SECONDARY ROUTE 25/17

TOPOGRAPHIC MAP
PORTION OF PENN COAL COMPANY MINE

MINE NO. 14-042 A

HARRISON COUNTY, WEST VIRGINIA

PLATE III

On May 1, 1967, authorization was received from the Project Officer to proceed with site preparation for tentative trial commencement during the week of May 8 through May 12. Mapping was then completed and the site was prepared for equipment installation. Effluent samples were collected from the mine opening prior to sealing the mine and were delivered to the Clarksburg Water Board and the Monongahela Enforcement Project Laboratories.

The trial preparation and completion then proceeded in the following manner:

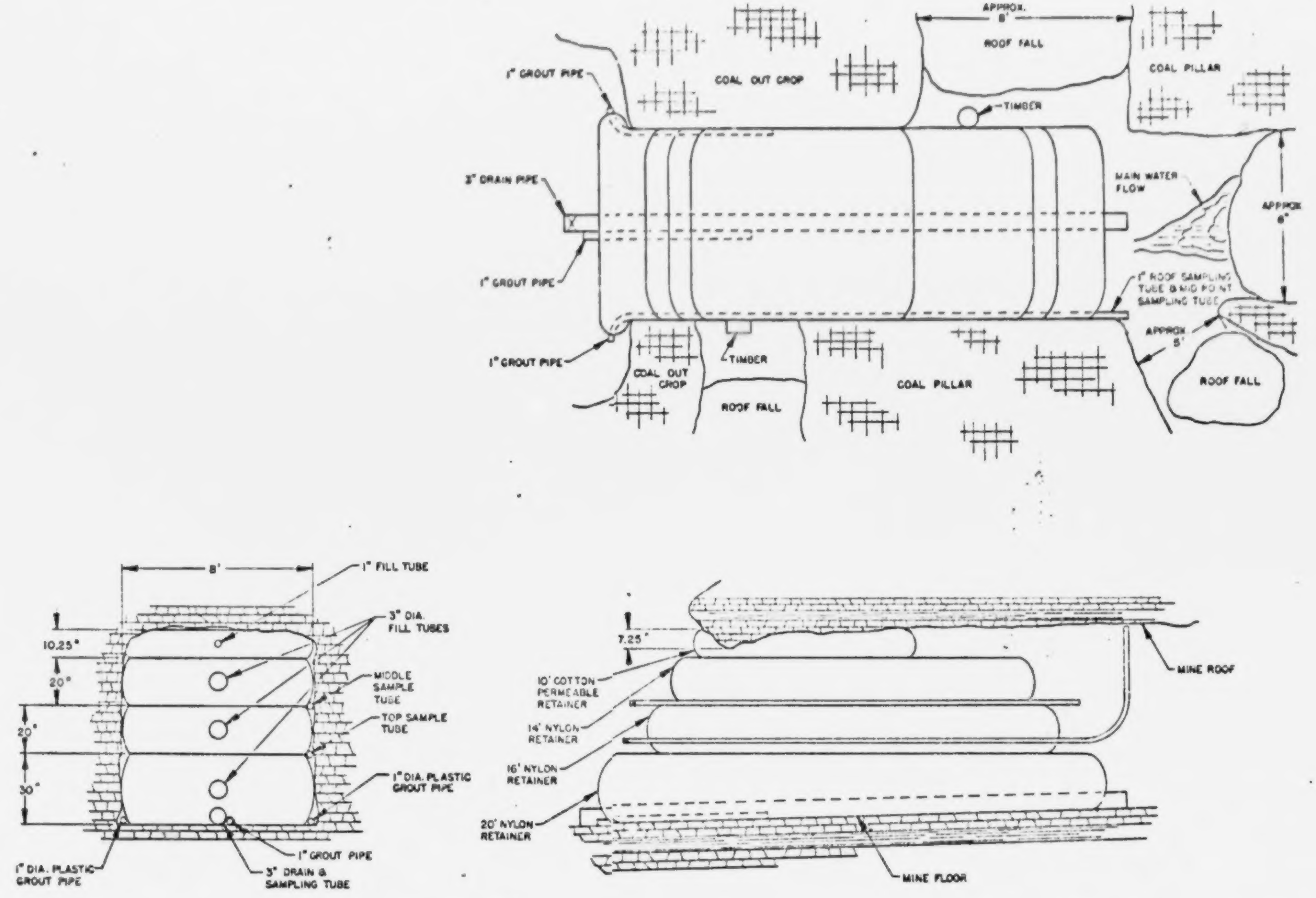
May 8, 1967 - The site was visually inspected by resident personnel from both Wheeling and Weston, West Virginia.

May 9, 1967 - Another mine drainage sample was taken for analysis. Debris which had accumulated the week following the original cleaning of the mine opening and debris for a distance of 30' into the mine was removed by earth moving equipment. This area was then hydraulically jetted with fresh water. A trench was dug into the mine floor approximately 3" deep, into which was laid a 30' length of 3" fiberglass pipe. Three 1" black plastic 160 psi. test grout pipes were also installed. One was placed at the base of the left wall facing the mine and extended approximately 10 feet into the mine and into a side cross cut which had partially subsided. The second grout pipe was attached to the previously described 3" fiberglass drain-pipe and extended approximately 10 feet into the mine. The third grout pipe was placed at the base of the right wall and extended past the first cross cut and into the first pillar, a total distance of approximately 14 feet into the mine. Drift dimensions at the widest point, excluding crosscuts, were measured to be

8' wide and 6' - 8 1/4" high. PLATE IV shows the general configuration of the mine opening and the proposed and completed placement of the Expendable Grout Retainers.

Sandbags were placed at the entrance to the mine and at a point approximately 20 feet inside the mine so as to confine the base Expendable Grout Retainer. A 20' x 10' x 3' Expendable Grout Retainer was then assembled and placed in the mine with the nylon fabric material placed around the injection line simulating conditions for placement in a small opening. A bulk cement unit was connected to the retainer as the air source and the retainer was inflated with air to observe filling characteristics, unfolding ability in the mine, coverage, and placement. Motion pictures and still photographs were taken preceding Expendable Grout Retainer placement and during the various stages of the operation until completion of the plug and seal was effected. Figures 7 through 16 illustrate the progress of the field trial and demonstrate placement techniques.

Inflation by air was satisfactorily completed and the retainer was then deflated and removed from the mine. Twenty cubic feet of grouting material, consisting of 50% cement, 50% by volume pozzolanic material, 2% accelerator ($CaCl_2$) and 2% bentonite was sprayed on the floor and walls of the mine, which coated the wall to a height of approximately 3 feet. This was undertaken to permit more effective bonding between the mine surface area and the Expendable Grout Retainer. This grout coating extended approximately 25 feet into the mine. The retainer was then repositioned in the mine and inflated with 400 cubic feet of continuously mixed cementitious material consisting of the above components which had been especially weighed and dry blended prior to delivery to the site. A height


APPROX. 8'
ROOF FALL
COAL PILLAR
1" GROUT PIPE
COAL OUT CROP
TIMBER
3" DRAIN PIPE
MAIN WATER FLOW
APPROX. 8'
1" GROUT PIPE
1" ROOF SAMPLING TUBE & MID POINT SAMPLING TUBE
APPROX. 5'
1" GROUT PIPE
COAL OUT CROP
TIMBER
ROOF FALL
COAL PILLAR
ROOF FALL
8'
1" FILL TUBE
10.25"
3" DIA. FILL TUBES
20"
MIDDLE SAMPLE TUBE
20"
TOP SAMPLE TUBE
30"
1" DIA. PLASTIC GROUT PIPE
1" DIA. PLASTIC GROUT PIPE
1" GROUT PIPE
3" DRAIN & SAMPLING TUBE
7.25"
10' COTTON PERMEABLE RETAINER
14' NYLON RETAINER
16' NYLON RETAINER
20' NYLON RETAINER
MINE ROOF
MINE FLOOR

XXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
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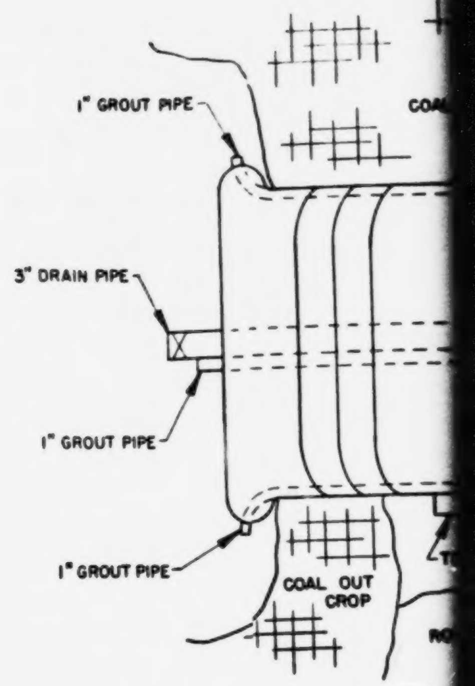
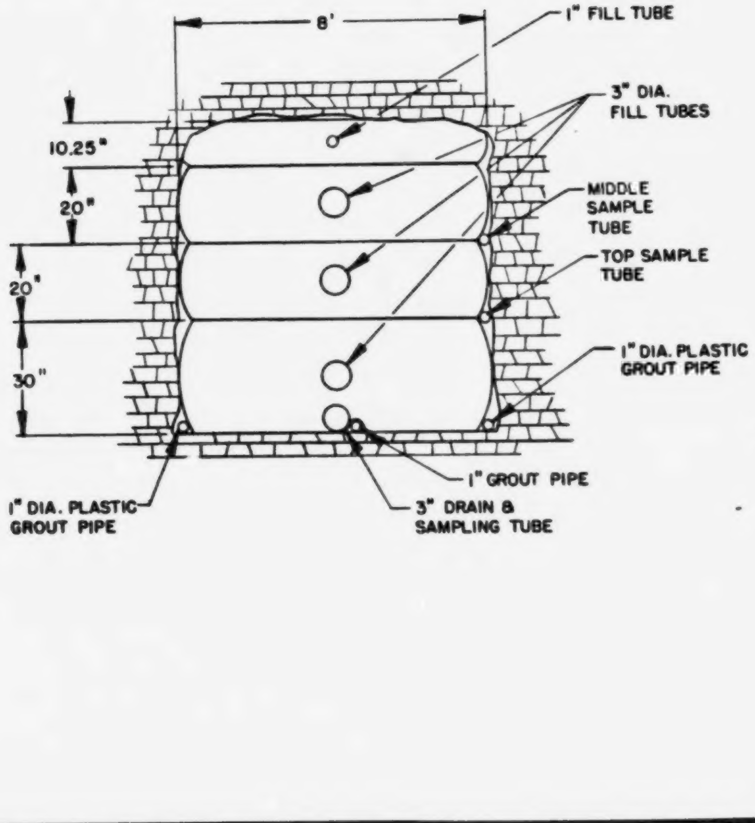
MINE SEAL INSTALLATION

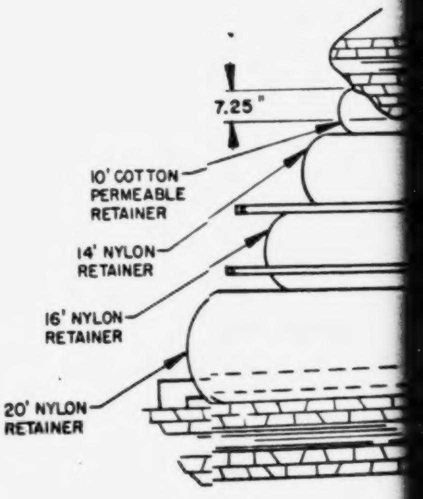
MINE NO.14-042A

HARRISON COUNTY, WEST VIRGINIA

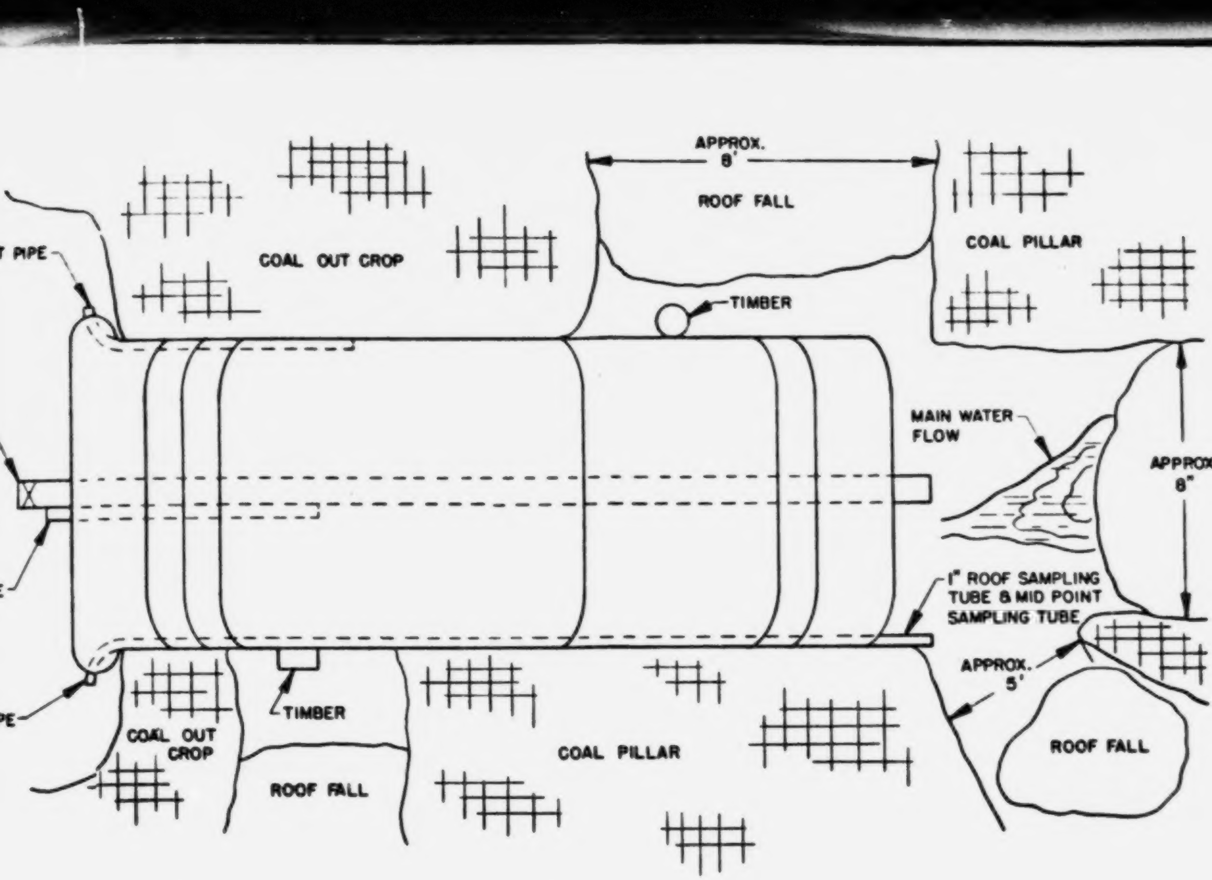
141-a PLATE IV

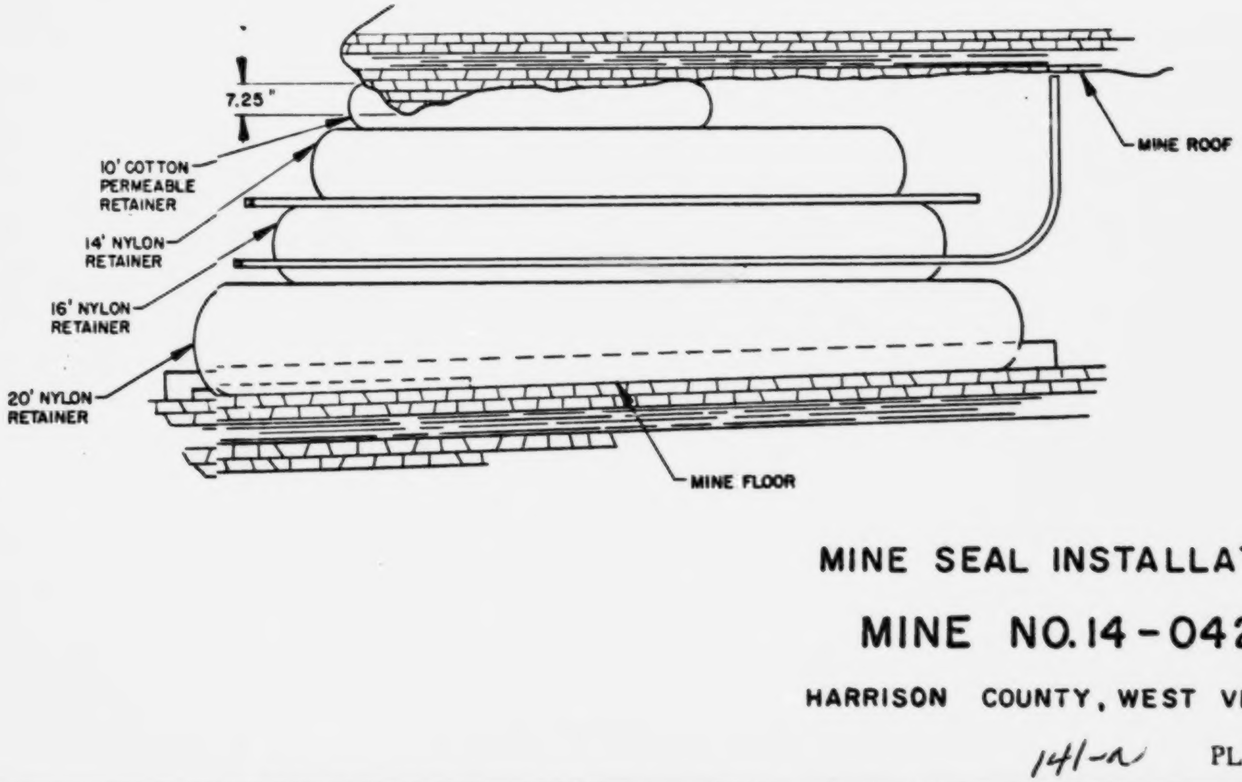

1" GROUT PIPE
3" DRAIN PIPE
1" GROUT PIPE
1" GROUT PIPE
COAL OUT CROP


8'
1" FILL TUBE
3" DIA. FILL TUBES
10.25"
20"
MIDDLE SAMPLE TUBE
20"
TOP SAMPLE TUBE
30"
1" DIA. PLASTIC GROUT PIPE
1" GROUT PIPE
1" DIA. PLASTIC GROUT PIPE
3" DRAIN & SAMPLING TUBE


7.25"
10' COTTON PERMEABLE RETAINER
14' NYLON RETAINER
16' NYLON RETAINER
20' NYLON RETAINER

A


APPROX. 8'
ROOF FALL
COAL PILLAR
1" GROUT PIPE
COAL OUT CROP
TIMBER
3" DRAIN PIPE
MAIN WATER FLOW
APPROX. 6"
1" GROUT PIPE
1" ROOF SAMPLING TUBE & MID POINT SAMPLING TUBE
APPROX. 5'
1" GROUT PIPE
TIMBER
COAL OUT CROP
COAL PILLAR
ROOF FALL
ROOF FALL

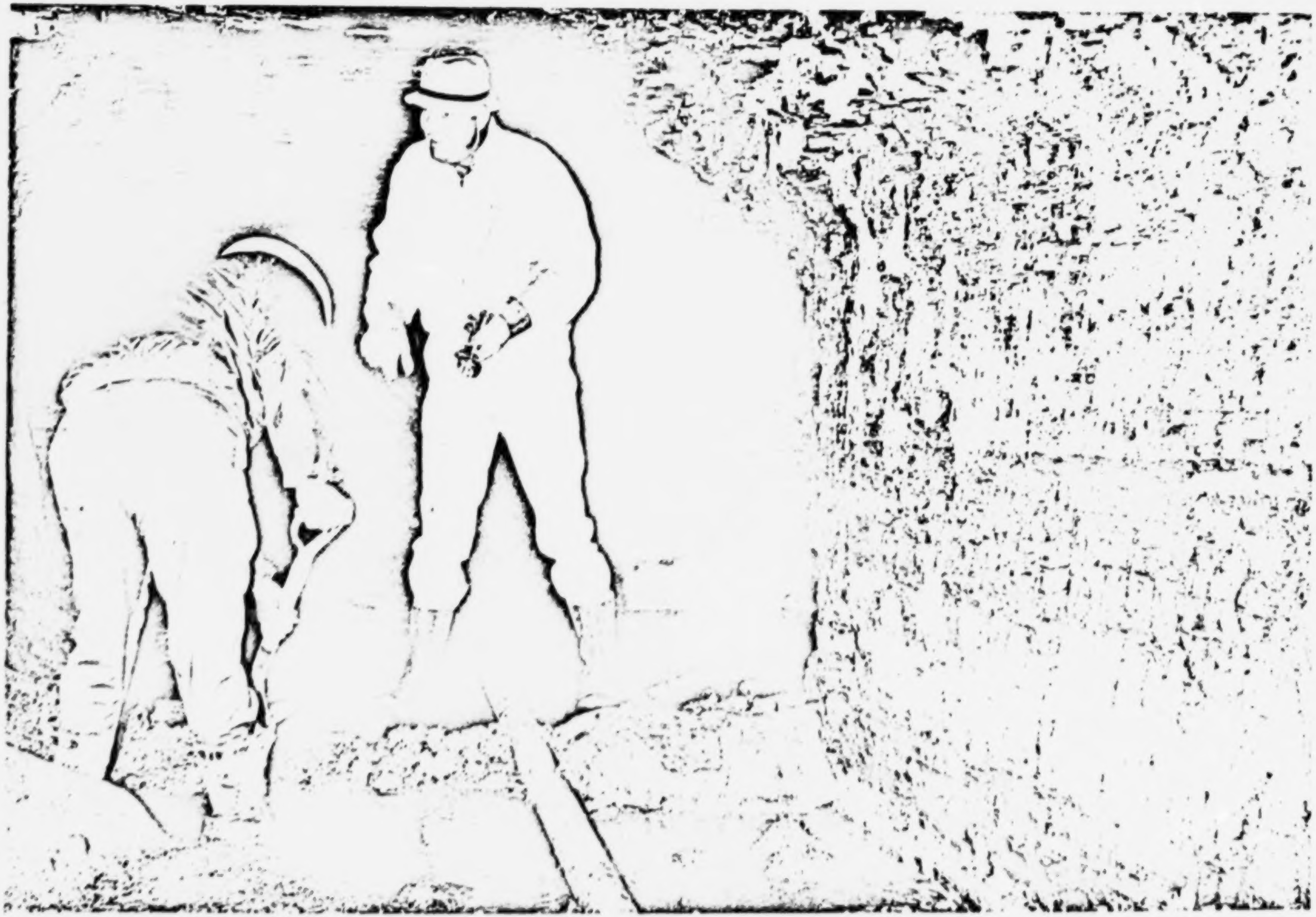

7.25"
MINE ROOF
10' COTTON PERMEABLE RETAINER
14' NYLON RETAINER
16' NYLON RETAINER
20' NYLON RETAINER
MINE FLOOR

MINE SEAL INSTALLATION

MINE NO. 14-042A

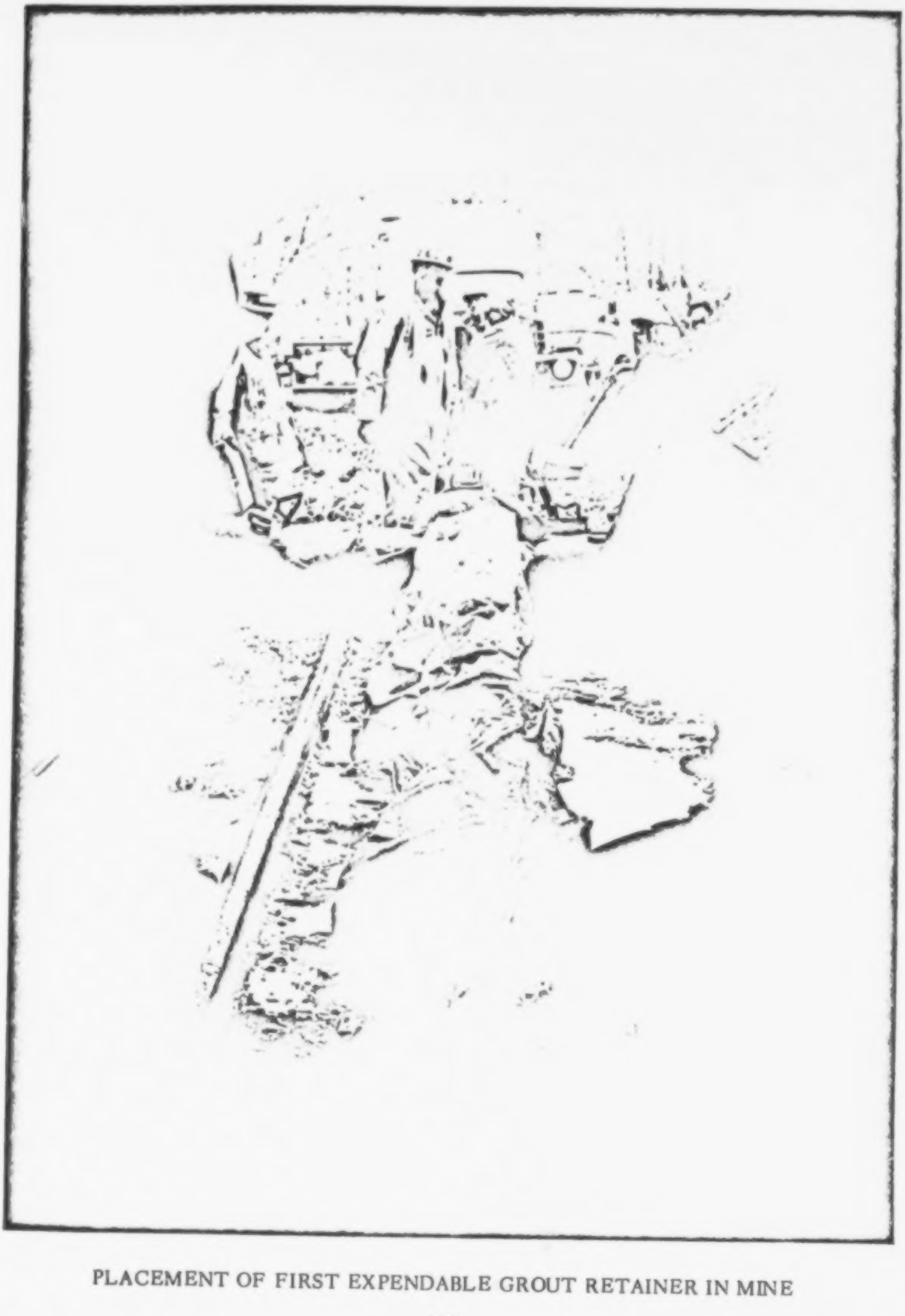
HARRISON COUNTY, WEST VIRGINIA

141-a PLATE IV



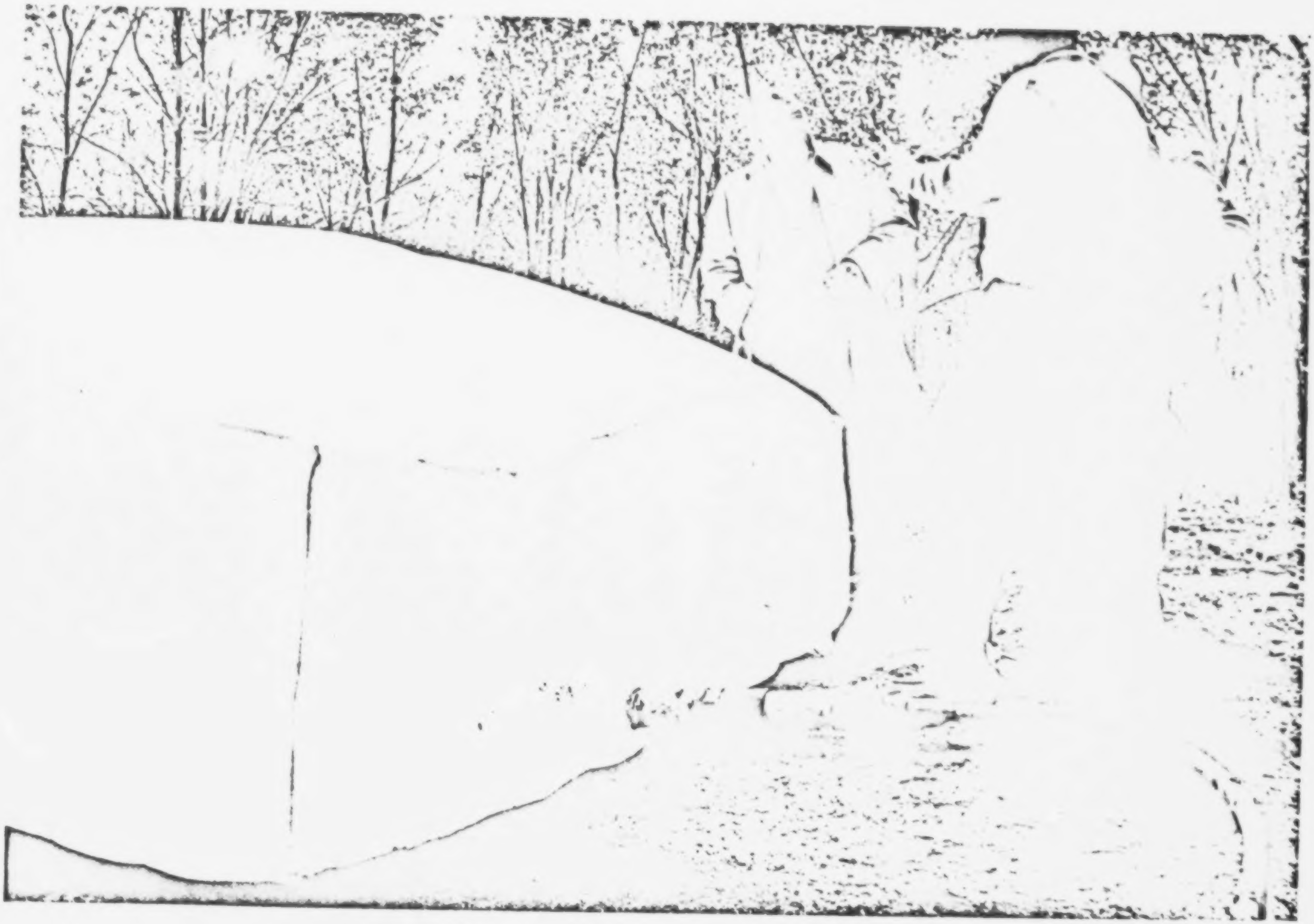
PREPARING MINE FOR DRAIN PIPE AND FIRST EXPENDABLE GROUT RETAINER

Figure 7



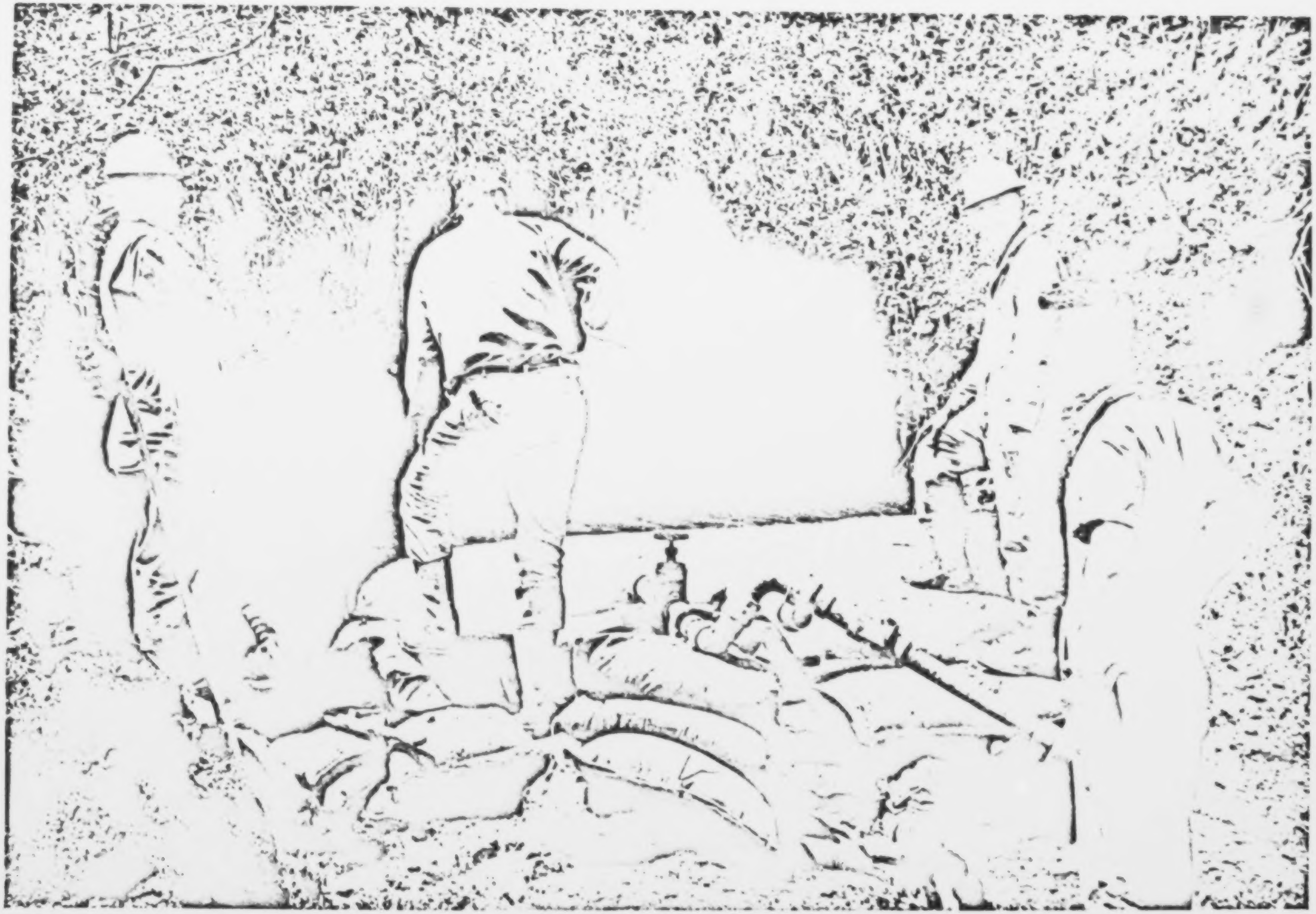
PLACEMENT OF FIRST EXPENDABLE GROUT RETAINER IN MINE

Figure 8



EXPENDABLE GROUT RETAINER INFLATED WITH AIR

Figure 9



FILLING SECOND EXPENDABLE GROUT RETAINER WITH WATER FOR TESTING OF PLACEMENT TECHNIQUES

Figure 10

FILLING SECOND EXPENDABLE GROUT RETAINER WITH GROUT SLURRY

Figure 11

SECOND EXPENDABLE GROUT RETAINER FILLED WITH GROUT SLURRY

Figure 12

EXPENDABLE GROUT RETAINER CONFORMING TO IRREGULARITIES OF MINE SURFACES DURING GROUT PLACEMENT

Figure 13

FILLING THIRD EXPENDABLE GROUT RETAINER WITH GROUT SLURRY

Figure 14

THREE EXPENDABLE GROUT RETAINERS IN PLACE AND FILLED WITH GROUT SLURRY

Figure 15

Reproduced from
best available copy.

MONITORING CLOSURE PRESSURE DURING FILLING OF FOURTH AND FINAL EXPENDABLE GROUT RETAINER

Figure 16

of 2' - 6" was attained at the mine opening by the grout inflated retainer while only 20 inches of height was attained at the rear of the retainer. This height differential was caused by the irregularities and slope of the mine floor. Excellent coverage at the irregular surfaces of the walls and cross cuts was noted.

The operation was temporarily halted to permit the slurry to harden prior to grouting and filling depressions which occurred farther into the cross cuts. A slurry was mixed in accordance with specifications which resulted from laboratory test procedures. These specifications established slurry weights at 14.1 pounds per gallon and volumes at 1.26 cubic feet of slurry per cubic foot of dry blended material. Thickening times were calculated at slightly in excess of three hours and 60 psi. compressive strength was anticipated in six hours.

Approximately five hours after filling the retainer, sufficient strength had been achieved to permit several men to traverse its surface to permit grouting of irregularities in the cross cuts and partial filling of the limited voids associated with these cross cuts. Filling of the right hand cross cut was accomplished to within one foot of the roof behind a roof fall that served as a partial dam. Approximately 245 cubic feet of slurry was used for this secondary grouting operation. The pilot trial was then halted until the following day.

S.?

May 10, 1967 - The bottom drain pipe, which extended under the base retainer to the fluid point beyond the rear of the retainer, was closed temporarily to determine whether leakage had occurred. None was in evidence under a hydrostatic head of approximately 6 inches of water.

Level surface conditions of the top of the retainer were investigated by means of a carpenter's long level and also by employing the use of a mercury tube extending the full length of the retainer. Although a few minor irregularities had occurred in the surface of the cement, the overall top surface of the retainer was level.

An inspection at the rear of the first retainer revealed that complete unfolding had not occurred in this area during filling operations, and, consequently, a full 20-foot level area had not resulted as was expected. The level area of the bag was measured and found to be 18 feet long. For this reason it was decided to use a 16-foot long retainer as the second retainer.

A second nylon Expendable Grout Retainer, 16' x 10' x 3', was prepared in the same manner as that used for the base. It was placed atop the base retainer and partially filled with water to determine placement position and coverage. Permeability of the bag permitted a considerable amount of the water to escape. As a result, only one foot of height was attained during this test water filling and the retainer was drained, removed from the mine opening, and dried. The operations for May 10 were suspended.

May 11, 1967 - Company personnel conferred and plans for equipment, materials, and procedures to be followed on May 12 were discussed. Due to considerable precititation during this period and subsequent deterioration of surface conditions created by equipment moving at the site, the working area was back-bladed to aid in a more efficient performance of the trial.

May 12, 1967 - Slurry mixing, handling and placing equipment was assembled on location and a second Expendable Grout Retainer, 16' x 10' x 3' and fabricated of nylon material, was prepared for positioning within the mine. Prior to the filling of this retainer, a sampling tube was installed in the mine to permit recovery of mine drainage from various water levels within the mine after the opening had become completely closed. The sampling tube was of 1" diameter plastic material, approximately 30 feet long, and was placed about 10 inches above the base retainer and attached to the mine wall on the right hand side. The opening at the extremity of this tube was extended to within 3 inches of the mine ceiling or hanging wall at the rear of the plug. The exterior end of the tube was equipped with a bronze gate valve.

It was also decided to sandbag both the front and rear of this second retainer in place since the installation was planned for trial and test purposes. However, before filling the second retainer with slurry, a 16' x 10' x 3' nylon retainer was also inflated with air outside the mine to demonstrate to Government, State and Company officials the appearance and configuration of the retainers.

Following this demonstration, the top of the base retainer and approximately 3 feet of the mine walls were then sprayed with 20 cubic feet of slurry containing 50% cement, 50% by volume pozzolanic material, 2% calcium chloride, and 1% bentonite to improve bonding. The second retainer, 16' x 10' x 3' and fabricated of nylon material, was then placed atop the first in the mine opening and filled with 280 cubic feet of slurry. One per cent bentonite was blended with the cement and pozzolan in this retainer to increase the slurry weight from 14.1 pounds per gallon to 14.6 pounds per gallon and to accelerate the setting time approximately one hour, thereby permitting installation of a third retainer the same day.

Approximately 50 cubic feet of this slurry was also used to fill the space adjacent to the retainer in the cross cut near the front of the mine opening and to spray the top of the first retainer prior to filling the second. It was found that filling this space with slurry tended to equalize the force on opposing sides of the retainer wall in this area and thereby relieve the retainer of some strain that had resulted from its conforming into this space.

The retainer unfolded and extended to the sides of the mine in a satisfactory manner as it was being filled with slurry. It was noted during the filling operation of this retainer that an air pocket which had formed beneath the fabric of the first retainer hindered the unrolling action of the second. A height of twenty inches was attained in filling the second retainer for a total height of fifty inches at the front of the mine. Three hours later the cement had reached sufficient strength to permit walking on its surface, and a second sampling tube, also equipped with a bronze gate valve at the exterior opening, was placed atop this retainer extending horizontally to the rear of the mine and beyond the intended plug length. After the installation of the middle sampling tube and grouting around the irregular sides of the cross cuts, the top of the second retainer and the walls of the mine were sprayed.

Following this operation, a third Expendable Grout Retainer, 14' x 10' x 3' and fabricated of nylon material, was injected with 195 cubic feet of the above described slurry with 1% bentonite, continuously mixed, to unroll the retainer. The retainer was filled to a height of approximately 21 inches. The operations were then suspended for that day.

A total of 345 cubic feet of cement slurry was used in the installation of the third retainer. Of this total, 195 cubic feet were used to fill the retainer to a 20-inch height and approximately 150 cubic feet were used to again fill the voids existing in the cross cuts adjacent to this retainer. A maximum pressure of 0.87 psi., measured with a mercury manometer, was reached as the retainer was being filled. The slurry in this retainer was allowed to set for approximately 12 hours before the fourth and final retainer was installed. After this period of time, the heat of hydration of the cement was causing dry steam to discharge from the interface between the second and third retainers.

Completion of the inflation of the third retainer resulted in a distance of 10-1/4" remaining between the roof or hanging wall of the mine and the top of the third Expendable Grout Retainer. This interval was also noted some 10 feet to the rear of the mine. However, a depression in the mine roof of 7-1/4" was present approximately 4 feet from the front and extending for some 4 feet in length, reducing the interval at that point to 3 inches.

May 13, 1967 - The fourth and closure Expendable Grout Retainer, 10' x 8' x 3', fabricated of a loose weave permeable cotton and designed to permit some cement slurry to be emitted through its mesh, was assembled. The emission of cement by fabric permeability is intended to improve the in-place bond between the third retainer and the roof and walls of the mine. The retainer was then positioned and a 1-inch diameter fill tube was inserted in this retainer instead of the 3-inch diameter perforated pipe used in the three previous nylon retainers. Approximately 70 cubic feet of 50-50 Pozmix slurry containing 1% gel and 2% calcium chloride was used to fill this retainer. In addition to this, approximately 120 cubic feet of this slurry was used for filling existing voids similar to those previously described. The height of this retainer after filling was 10.25 inches, as shown in PLATE IV. Pressure was applied to this retainer to cause extrusion of the slurry through the permeable fabric to produce an effective bond to the mine roof.

Hydraulic pressure exerted within this top retainer by the cementing slurry was monitored utilizing a mercury manometer to indicate pressures within ranges of 1/10 psi. The maximum pressure attained was 1 psi. An additional 10 cubic feet of cementing material was then forced through the weave of the retainer fabric before a maximum pressure of 1.5 psi. was reached and 10-1/4" of height was attained at the opening of the mine to correspond to the same amount of height of the hanging wall behind the described roof depression.

The retainer was then closed in under 1.5 psi. of standing pressure. The remaining 110 cubic feet of cement slurry was utilized to spray and coat the front of the retainers and the adjacent walls. A small dam was constructed on the left hand side, or west side of the mine, approximately 3 feet in height, covering an area from which a small seep had begun. This dam was also filled with cement in an attempt to shut off this seep, which apparently was successful, as no fluid has been observed at this point through or around the wall since.

The mine was permitted to flow through the bottom drain pipe until May 15, 1967, at which time all valves were closed. Sampling continued on a daily basis from that time until May 22, 1967. The water level within the mine progressively increased in height due possibly to an extreme amount of rainfall which occurred during and following the pilot trial. On June 6, 68-1/2" of water existed behind the plug.

It is anticipated some grouting may be necessary for an extended period of time after monitoring the plug created by this method. It is also anticipated some exterior finishing or cement spraying will be applied at the plug face to improve the exterior appearance of the mine seal.

Samples of fluid received from the mine floor and from the mid-height of the drift have been submitted to the Monongahela Enforcement Project laboratory at Wheeling, West Virginia for analysis. Additional samples will be taken and the analyses are to be compared with those samples taken before and after completion of the seal. Monitoring of the seal and the environment of the mine, especially the highwall and coal seam elevations, will be continued.

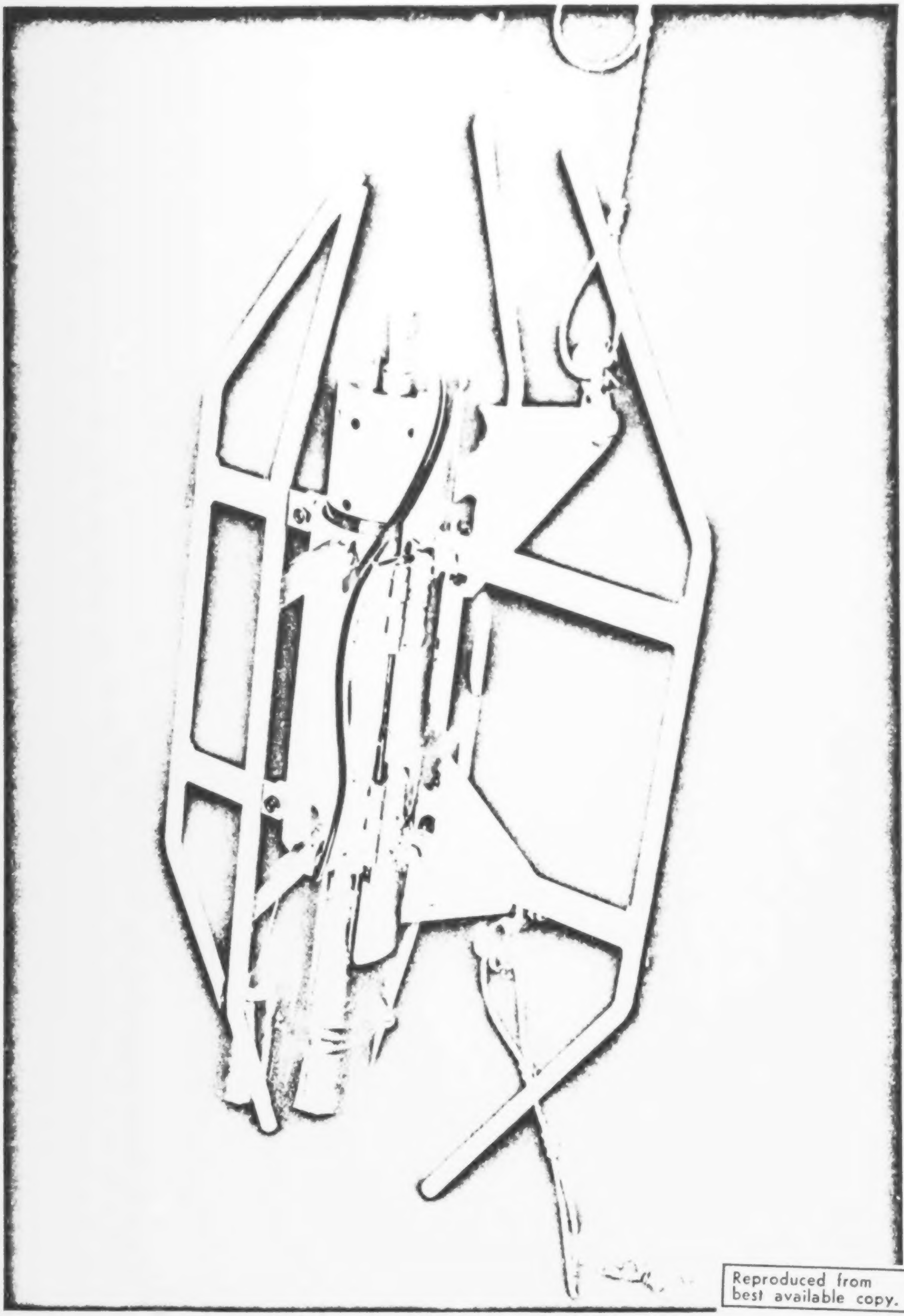
[illegible], [illegible], the Project Officer requested a plan and schedule for [illegible] inspection of Mine No. 14-042A. The purpose of this inspection was to examine the mine interior at the rear of the Expendable Grout Retainers employed in the closing of this mine opening. The work was to commence on June 6, 1967.

A local contractor was retained to prepare the site. Preparation consisted of clearing brush and small trees, and the construction of an access road along the north side of the mine drainway to a point directly above the mine. An area, approximately 30' x 40', was cleared and leveled at this point sufficiently large to accommodate a drilling rig. A culvert was also installed in the drainway to permit the mine water to flow unrestricted while the access road was in use. This work was completed on June 6, 1967.

After consideration of several bids, a drilling contractor was retained to drill a 7-3/8" diameter hole and to install 7" O.D. casing to the mined cavity. Surface measurements were made to determine the location for drilling operations. A point was selected for drilling which was approximately 8 feet behind the rear of the topmost retainer. This hole was completed to a depth of 13 feet into the top of the mined cavity, and cased on June 8, 1967.

On June 13, television equipment arrived at the site and was set up preparatory to the inspection, which, on June 14, was carried out and completed. There were 23 "runs" made by the television camera into the mine. Each "run" consisted of lowering the camera, which was equipped with a quartz light, into the mine through the drilled and cased hole to permit either viewing or photography of the mine interior behind the retainers. The mine was filled with water to within 16" of the roof thereby permitting inspection both above and below the water surface. Various focal lengths were attempted with the television camera and, although the inspection was satisfactory when viewed on the television monitor, some detail was lost in the photography. It is felt that a remotely controlled variable focal length television camera would possibly be helpful on future inspections.

The photographs were viewed by the Project Officer on June 29, 1967. Photographs of the television camera and monitoring equipment are shown in Figures 17 and 18, respectively.



TELEVISION CAMERA

Figure 17

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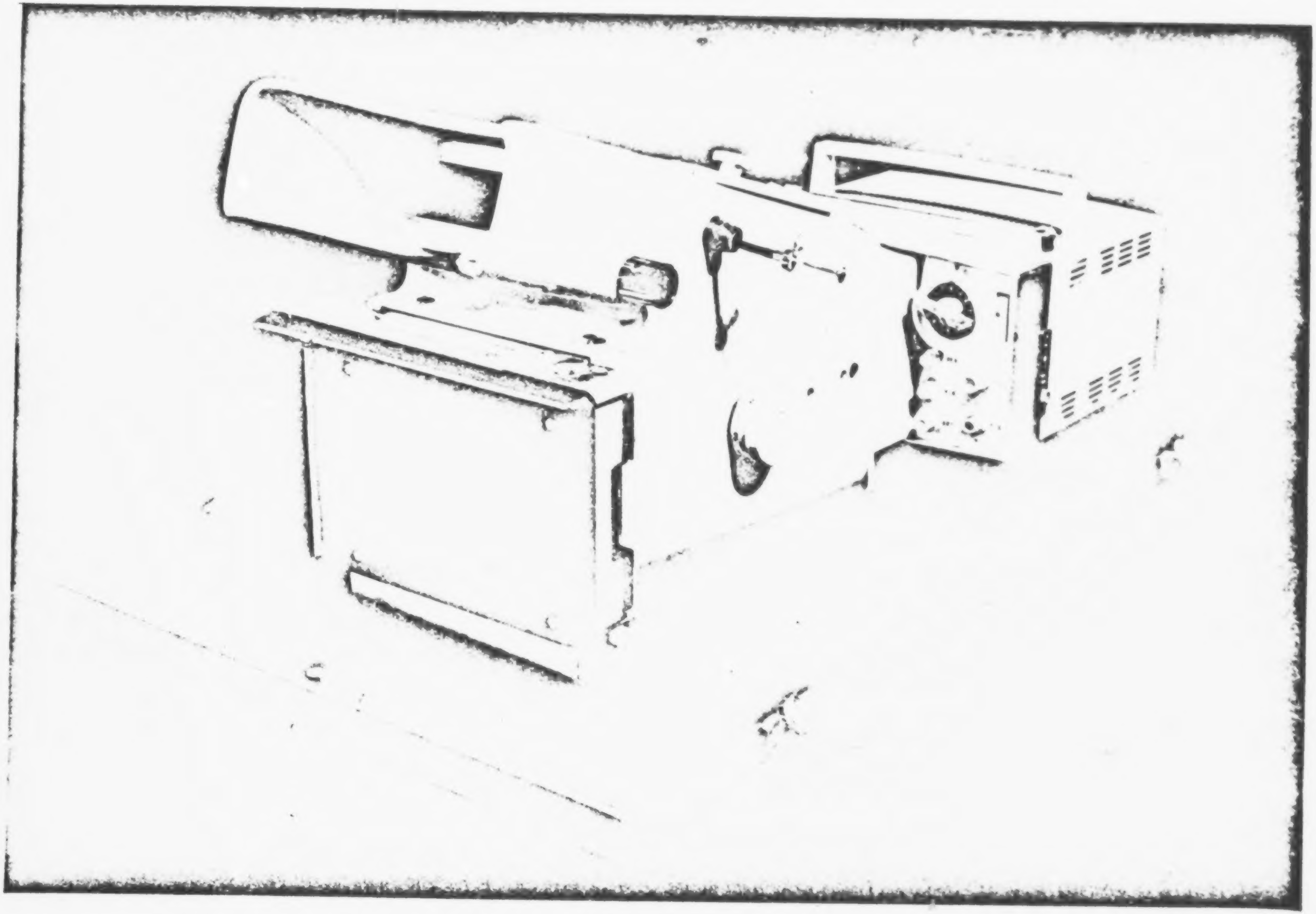


TELEVISION MONITORING EQUIPMENT

Figure 18

APPENDIX

Table A

WATER QUALITY OF MINE DISCHARGES

Mine No.	Date	Flow gpm	Temp	p^H	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
04-060	8-23-65	2.2		6.5	600	61	25	286	2.1	254	2.2
	1-12-67	.5									
04-067	8-24-65	Dry									
	1-11-67	Dry									
04-068	8-24-65	S.S.									
	1-11-67	Dry									
04-072	8-25-65	Dry									
	1-11-67	Dry									
04-080	8-26-65	Dry									
	1-12-67	Dry									
04-081	8-26-65	Dry									
	1-11-67	Dry									
04-083	8-26-65	Dry									
	1-11-67	Dry									
04-085	8-30-65	Dry									
	1-11-67	Dry									
04-086	8-30-65	Dry									
	1-11-67	Dry									
04-087	8-30-65	Dry									
	1-11-67	Dry									

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	A1 CDTA
04-105	9- 8-65	.5		3.4	2400	447	0	1820	15.5	2520	13.2
	1-13-67	S.S.									
04-111	9- 9-65	Imp.		1.9	5000	2115	0	1510	176.0	3560	140.0
	1-13-67	Dry									
04-119	9-13-65	1.5	24°	1.9	6000	4010	0	1750	936.0	5800	112.0
	1-12-67	Dry									
04-122	9-14-65	.5	24°	2.2	4000	2280	0	778	624.0	4140	49.4
	1-12-67	.025		2.8	4000	2160	0	1330	720.0	3484	136.0
04-132	9-16-65	Dry									
	1-12-67	Dry									
12-001	8-30-65	Dry									
	1-17-67	S.S.									
12-002	8-30-65	Dry									
	1-17-67	Dry									
12-003	8-30-65	Dry									
	1-17-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
12-004	9- 1-65	75.6			2200	85	210	552	3.4	1060	32.0
	1-17-67	200		6.5	2860	0	282	440	2.4	1170	4.0
	1-31-67	170	54°	7.3		0	279	422	13	1130	0
12-005	8-30-65	Dry									
	1-17-67	Dry									
12-006	8-30-65	Dry									
	1-17-67	Dry									
12-007A	8-31-65	.5	24°	3.0	2800	243	93	1070	9.1	1445	13.3
	1-17-67	10		6.1	2600	0	320	680	6.0	1105	6.0
	1-31-67	13	54°	6.9		0	324	570	54	1130	0
	2-15-67	60		6.3	2160	10	338	440	4.0	845	2.0
	3- 1-67	60		6.3	2364	0	234	700	4.8	1040	0
12-007B	3-29-67	25	54°	6.7	1220	0	171	480	0	468	4.8
12-009	8-31-65	Dry									
	1-17-67	Dry									
12-070	11-9-65	.5	9°	6.3	1100	51	207	420	3.1	400	0.6
	1-17-67	.5									
14-003	3-29-67	Seep									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
14-005	1-21-66	Dry									
	1-18-67	Dry									
14-040	2-22-66	5		2.7	3640	1730	0	1168	389.0	2600	61.1
	1-25-67	0.5		3.0	3020	970	0	1330	210	2236	55.0
	3-17-67	20		2.8	4000	1750	0	1320	318	2912	89.0
	3-17-67	12		2.4	6760	4620	0	1200	1200	6500	355.0
14-042A	2-22-66	8		2.6	4032	1998	0	1120	435.7	2819	86.5
	1-25-67	1		2.6	3920	2530	0	1320	552	3640	161.0
	3- 2-67	1-1.5									
	3- 8-67	30		2.5	4400	2350	0	1350	480	3172	145.0
	3-17-67	18		2.6	4128	2750	0	920	588	4160	158.0
14-042B	3-22-67	1		6.7	2450	0	46	1890	.2	1664	.7
14-044	2-12-66	Dry									
	1-25-67	Seep		2.9	3460	1420	0	1500	66.0	2548	128.0
16-054	5-18-65	1	26°	3.4	950	133	32	329	4.5	337	4.7
	1-18-67	Dry									
16-055	5-18-65	Dry									
	1-16-67	Dry									
16-056	5-18-65	17.6	20°	3.2	1475	307	26	324	93.6	446	20.7
	1-16-67	S.S.									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/l	Alk mg/l	Hard EDTA	Fe CDTA	SO_4	Al CDTA
16-057	5-19-65	Imp.	14°	3.6	675	150	0	184	4.5	240	6.4
	1-18-67	Dry									
16-061	5-20-65	S.S.	21°	3.6	340	74	0	137	5.1	145	4.7
	1-16-67	3.5		3.0	1622	450	0	450	22.0	832	38.0
	1-31-67	3.5	53°	2.7		377	0	488	72	800	37
16-063	5-20-65	.5	24°	3.4	500	87	0	161	13.4	188	5.4
	1-16-67	S.S.									
16-064	5-20-65	1	27°	6.1	170	19	60	70	1.8	15	1.2
	1-16-67	0.75									
16-066	5-24-65	Dry									
	1-16-67	Dry									
16-073	6- 1-65	Dry									
	1-16-67	Dry									
16-076	6- 2-65	Dry									
	1-17-67	Dry									
16-079	6- 2-65	Imp.	23°	2.8	850	201	0	307	18.4	364	8.5
	1-17-67	Imp.									
16-080	6- 3-65	Imp.	9°	3.7	160	14	1	43	0.8	43	1.2
	1-17-67	S.S.									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO$_4$	Al CDTA
16-081	6- 3-65	Dry									
	1-17-67	S.S.									
16-082	6- 3-65	1	15°	5.0	180	7	191	161	47.4	4.8	4.5
	1-17-67	S.S.									
16-083	6-17-65	S.S.	14°	3.8	760	281	0	320	40.8	435	27.4
	1-17-67	Dry									
16-084	6- 3-65	Dry									
	1-17167	Dry									
16-085	6- 3-65	1	15°	3.8	145	26	2	57	9.0	51	9.6
	1-17-67	0.3									
16-086	6- 3-65	Dry									
	1-17167	Dry									
16-087	6- 3-65	Dry									
	1-17-67	Dry									
16-096	6- 9-65	1	10°	2.6	1700	692	0	410	8.5	866	21.8
	1-17-67	0.6									
16-097	6- 9-65	.2	16°	2.9	1150	344	0	119	38.8	438	14.2
	1-17-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
16-098	6- 9-65	Dry									
	1-17-67	Dry									
16-099	6- 9-65	.2	26°	3.0	1200	800	0	220	320.0	588	19.2
	1-17-67	0.1									
16-100	6- 9-65	.2	26°	3.0	1190	476	0	98	5.4	588	27.1
	1-17-67	Seep									
16-101	6- 9-65	2	26°	2.9	1000	414	0	248	18.6	545	16.8
	1-17-67	Dry									
16-102	6-10-65	Dry									
	1-17-67	0.5		3.6	406	140	0	270	1.0	124	10.0
	1-17-67			3.9		71	0	72	12	140	2
16-103	6-11-65	Dry									
	1-17-67	Dry									
16-104	6-11-65	Dry									
	1-17-67	Dry									
16-105	6-11-65	Dry									
	1-17-67	Dry									
16-106	6-11-65	Dry									
	1-17-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
16-108	6-14-65	Dry									
	1-17-67	Dry									
16-111	7-16-65	.2	17°	5.6	260	0	198	262	20.1	104	358.0
	1-17-67	Dry									
16-112	7-16-65	1	14°	5.8	920	0	169	204	33.9	372	24.0
	1-17-67	1		6.3	780	0	55	310	1.0	281	1.0
16-113	7-16-65	1	17°	4.8	700	54	56	55	518.0	58	211.0
	1-17-67	Seep									
16-115	6-16-65	Dry									
	1-17-67	Dry									
16-117	6-17-65	.2	15°	3.2	970	334	0	249	54.3	403	10.8
	1-17-67	Seep									
16-118	6-17-65	.2	18°	4.9	690	132	57	211	14.4	297	7.8
	1-17-67	Seep									
16-119	6-18-65	Dry									
	1-17-67	Dry									
16-120	6-18-65	Dry									
	1-17-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
16-121	6-18-65	.2	14°	3.4	850	165	0	274	16.0	346	3.2
	1-17-67	Seep									
16-122	6-18-65	3	11°	3.2	2400	705	0	553	80.8	1028	31.2
	1-25-67	Seep		6.4	544	0	232	200	1.0	30	1.0
16-123	6-18-65	Dry									
	1-17-67	Dry									
16-124	6-18-65	Dry									
	1-17-67	Dry									
	1-17-67			3.3		51	0	236	98	380	0
16-125	6-18-65	Dry									
	1-17-67	Dry									
16-126	6-18-65	.5	20°	3.2	1175	184	29	107	26.5	261	10.8
	1-17-67	Seep									
16-127	6-22-65	Dry									
	1-17-67	Seep									
16-128	6-22-65	Dry									
	1-17-67	Dry									
16-129	6-22-65	Dry									
	1-18-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
16-130	6-22-65	.2	21°	3.8	375	62	0	97	5.3	123	0.8
	1-18-67	Dry									
16-131	6-22-65	Dry									
	1-18-67	Dry									
16-132	6-22-65	Dry									
	1-18-67	Dry									
16-133	6-22-65	Dry									
	1-18-67	Dry									
16-134	6-22-65	Dry									
	1-18-67	Dry									
16-135	6-22-65	Dry									
	1-18-67	Dry									
16-139	6-23-65	.2	23°	4.1	580	185	0	192	37.3	196	8.9
	1-18-67	Dry									
16-140	6-23-65	.2	24°	4.5	645	60	2	317	1.9	36	1.4
	1-17-67	Seep									
16-141	6-23-65	Dry									
	1-17-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
16-142	6-23-65	1	27°	5.4	1690	336	132	1890	21.5	1040	0.7
	1-17-67	1.5		5.4	1282	30	20	550	3.0	559	5.0
	1-31-67	1.5	50°	6.0		5	21	480	14	730	0
16-143	6-23-65	.5	19°	5.4	500	259	0	276	20.4	222	0.8
	1-17-67	Dry									
16-146	6-28-65	.5	22°	3.9	390	41	0	139	2.4	142	1.4
	1-18-67	S.S.									
16-147	6-28-65	.5	26°	5.5	390	23	50	187	17.4	140	5.7
	1-18-67	S.S.									
16-148	6-28-65	.5	24°	6.1	150	34	84	83	6.7	20	1.3
	1-18-67	S.S.									
16-149	6-29-65	Dry									
	1-17-67	Dry									
16-150	6-30-65	Dry									
	1-18-67	Dry									
16-152	7- 2-65	Dry									
	1-17-67	Dry									
40-002	11- 4-65	Dry									
	1-10-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
40-004	11- 4-65	.5	10^{o}	6.2	2190	146	21	1330	4.6	1460	1.6
	1-11-67	Dry									
40-005	11- 4-65	Dry									
	1-11-67	10		6.4	1862	20	204	1430	7.2	1118	0
	1-26-67	11	54^{o}	7.55		0	201	910	16	750	0
	3-29-67	15	54^{o}	4.5	1502	150	0	860	.1	876	21.2
40-008	11- 4-65	Dry									
	1-11-67	Dry									
40-009	11- 4-65	Dry									
	1-11-67	Dry									
	3- 2-67	Dry									
40-013	11- 8-65	Dry									
	1-11-67	Dry									
40-014	11- 8-65				2454	483	25	1543	39.3	1636	18.3
	3- 2-67	No openings found.									
40-015	11- 9-65	Dry									
	1-12-67	Dry									
	3- 2-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
40-016	11- 9-65	6.8	11°	3.0	3500	962	0	2040	173.0	3000	28.8
	1-12-67	8		2.9	3260	860	0	1820	120.0	2132	69.0
	1-26-67	15	53°	2.85		306	0	1768	151	2400	11
	3-22-67	150		3.4	2748	705	0	1440	189.6	3640	58.4
40-017	11- 9-65	8.2	12°	2.9	3250	1040	0	1550	171.0	2180	39.2
	1-12-67	15		2.8	3420	1710	0	1720	516.0	3536	90.0
	1-27-67	13	54°	2.5		1724	0	1710	572	3900	30
	1-27-67			3.1		153	0	950	63	1100	8
40-034	11-18-65	1.6	4°	2.9	3500	722	27	1520	66.3	1680	9.3
	1-10-67	1.3		6.5	1344	0	207	1000	5.0	832	3.0
	2- 1-67	4.5	48°	3.0		571	0	1540	173	2200	10
	2- 1-67	2.0	48°	7.45		0	234	882	19	840	0
40-036	11-19-65	6	5°	6.0	2400	148	0	1200	44.1	1490	2.4
	1-11-67	6.5		4.8	2400	180	6	1200	62.4	1482	23.0
	2- 1-67			3.0		204	0	1346	60	1900	4
	2- 1-67	7.5	46°	6.55		0	12.3	1288	746	1450	0
40-037	11-19-67	14.1	6°	2.8	2700	610	0	1445	40.8	1600	15.9
	1-10-67	8.5		3.0	2440	460	0	1370	26.4	1768	21.2
	2- 1-67	8		6.9		0	79	1452	30	1500	0
	2- 1-67	8	54°	2.7		439	0	1466	160	2100	15

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO$_4$	Al CDTA
40-040	11-23-65	33.5	11°	3.7	2450	320	0	1130	9.0	1360	8.8
	1-10-67	80		4.6	1942	90	7	930	10.0	1716	14.2
	2- 1-67	72	54°	4.6		41	7	900	26	1300	0
40-041	11-23-65	10	11°	6.5	2000	83	203	830	21.3	920	1.2
	1-10-67	20		6.0	2080	20	214	910	26.4	1105	6.0
	2- 1-67	24	54°	6.65		0	225	786	40	1000	0
40-042	11-23-65	3.2	8°	6.3	2400	73	68	1100	12.3	1280	1.7
	1-10-67	2.6		4.6	2386	140	4	1110	18.0	936	12.0
	2- 1-67	2	50°	5.7		5	30	972	72	1400	0
40-043 (40-042A)	11-23-65	12	10°	6.6	2200	182	74	1461	6.6	1360	1.3
	1-10-67	S.S.									
	2- 1-67)	15	52°	6.2		0	114	1200	28	1800	0
	2- 1-67)		52°	4.5		41	0	1080	30	1250	0
40-045	11-23-65	Dry									
	1-11-67	Dry									
40-046	11-23-65	120	8°	4.7	2200	80	18	1180	6.7	1250	4.5
	1-11-67	100	(from 040, 041, 042, 043)								
40-051	11-24-65	Dry									
	1-10-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
40-052	11-29-65	2.5	10°	3.2	2400	361	0	1330	44.7	1560	6.3
	1-10-67	Dry									
	3- 2-67	3									
40-053	11-29-65	5.5	20°	2.7	2500	352	0	1250	10.3	1520	5.6
	1-10-67	sample taken nearby									
		052 and 053		3.7	1422	160	0	810	1.2	806	7.0
	3- 2-67	Dry									
40-054	11-29-65	Dry									
	1-10-67	2.5		3.3	2280	290	0	1560	5.0	1300	8.0
	1-30-67	0.5	40°	3.7		102	0	1386	11	1600	0
40-055	11-29-65	Dry									
	1-10-67	Dry									
40-058	12- 1-65	1.5	10°	6.1	3000	690	208	2200	22.6	1740	0.1
	1-11-67	Seep		4.4	2680	200	0	2060	58.0	1924	0
	3- 2-67	19	46°	7.2	2900	10	397	3830	1.2	1846	0
	3- 2-67	20	38°	5.4	2748		21				
40-063	12- 2-65	6.4	10°	2.7	3100	929	0	1500	120.6	2346	43.5
	1-11-67	2.5		2.8	3720	1180	0	1350	168.0	2860	106.0
	1-27-67)	10	50°	2.95		1020	0	1410	200	2820	0
	1-27-67)		50°	2.65		1030	0	1512	154	3400	0

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
40-064	12- 2-65	99.8	10°	6.0	3000	140	11	1460	108.0	1710	2.1
	1-11-67	120		5.6	2460	20	73	1270	15.0	1560	4.0
	1-30-67)	120	54°	6.15		0	87	1114	37	1580	0
	1-30-67)		54°	6.3		0	361	1390	25	1580	0
40-065	12- 2-65	Dry									
	1-11-67	Dry									
40-066	12- 2-65	87.2	11°	5.9	2600	252	175	1120	60.0	1320	0.1
	1-11-67	S.S.									
40-067	12- 3-65	5.5	5°	5.4	2500	368	6	1660	79.6	1760	12.6
	1-25-67	4.75		5.1	2240	200	3	1500	110.4	1430	24.0
				3.0	2660	420	0	1470	39.0	1586	3.4
	2- 1-67	4	46°	6.3		0	100	1374	58	1500	0
	2- 1-67	1.5	50°	6.65		0	237	1486	53	1580	0
40-070	12- 3-65	Dry									
	1-12-67	Dry									
	3- 2-67	Dry									
40-071	12- 3-65	.5	2°	2.4	4200	1350	0	1310	224.0	1520	97.8
	1-12-67	S.S.									
40-073	12- 3-65	Dry									
	1-12-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	A1 CDTA
40-074	12- 7-65	14.5			2125	218	149	1470	0.9	1370	1.1
	3- 2-67	Dry									
	3-17-67	Dry									
40-075	12- 7-65	4	4°	5.3	2100	120	63	1290	1.7	1320	0.0
	1-25-67	Seep		5.5	344	40	19	250	.1	94	.2
40-076	12- 7-65	Dry									
	1-25-67	Dry									
40-077	12- 7-65	20.75	6°	3.0	3800	793	67	2030	190.5	2560	20.9
	1-12-67	24		2.8	3480	1200	0	1730	222.0	2704	116.0
	1-27-67	16	52°	2.6		969	0	1666	340	3000	0
40-078	12- 9-65	3	7°	2.8	3400	920	0	2420	143.0	2960	15.8
	1-12-67	3		2.8	4320	2250	0	1960	792.0	3900	84.0
	1-27-67	5	54°	2.75		1500	0	1938	548	4000	0
40-079	12- 9-65	6.5	1°	2.8	3150	1515	0	1715	349.5	3005	57.0
	1-13-67	2		2.7	3460	2060	0	1530	348.0	3526	0
	1-30-67	2.25	42°	2.6		785	0	1470	145	2500	69

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
40-081	12- 9-65	44.85	7°	3.1	3000	520	0	1360	52.8	2100	10.2
	1-13-67	Seep		2.7	3960	1720	0	1580	312.0	3328	0
	1-30-67	7.5	60°	2.5		1663	0	1612	425	3700	14
	1-30-67	24	54°	3.0		571	0	1366	121	2300	0
	1-30-67	Seep		3.1		184	0	1732	30	2000	4
	1-30-67			2.6		714	0	1422	149	2400	23
40-083	12- 9-65	Dry									
	1-13-67	3		5.8	2300	20	103	1450	9.3	1456	2.0
	1-30-67	3	40°	6.6		0	136	1540	30	1700	3
40-085	12- 9-65	26.5	6°	3.0	3000	50	129	1080	0.9	1170	0.4
	1-13-67	6		2.5	3180	570	0	1400	12.0	2080	0
	1-30-67	20	54°	2.75		316	0	1340	53	2150	7
40-087	12-10-65	Dry									
	1-19-67	Dry									
40-096	4-25-66	10	19°	6.8	1070	0	90	609	9.2	472	0.2
	4-12-67	7.5		6.8	360	0	124	300	2.6	110	.7
58-001	4-19-65	4.5	14°	2.9	1325	562	0	294	90.0	699	32.8
	1-14-67	1		2.6	1820	200	0	200	7.2	205	24.0
58-002	4-19-65	3.55	15°	2.9	1550	525	0	390	70.0	760	29.5
	1-19-67	1									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
58-003	4-19-65	5	15°	5.7	340	7	6	134	1.1	122	0.8
	1-14-67	Dry									
58-007	4-20-65	14.25	15°	3.0	527	169	6	110	40.1	212	7.4
	1-14-67	.5									
	3- 1-67	15	42°								
58-010	4-20-65	47.4	13°	3.8	120	18	0	23	2.4	28	1.4
	1-25-67	0.75		2.9	1320	390	0	290	53.0	507	15.0
		2.5		3.0	1000	280	0	260	11.2	410	21.2
	3- 1-67	30	42°	3.3	320	90	0	100	1.3	78	3.8
	3- 1-67	10	54°	3.0	600	70	0	250	8.8	148	4.4
58-011	4-20-65	5	17°	2.8	1150	386	0	147	70.0	437	19.3
	1-14-67	S.S.									
58-012	4-20-65	10	11°	3.1	430	76	0	51	4.6	92	2.9
	1-14-67	.5									
	3- 1-67	5	48°	3.2	340	90	0	250	2.1	60	2.7
58-013	4-21-65	Imp.	10°	6.6	135	2	18	47	0.2	29	0.3
	1-14-67	S.S.									
58-014	4-21-65	Dry									
	1-14-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
58-015	4-21-65	Dry									
	1-14-67	Dry									
58-016	4-21-65	Dry									
	1-14-67	Dry									
58-017	4-21-65	87.2	10°	7.3	285	8	22	485	3.9	456	0.4
	1-16-67	2		5.7	1640	30	15	1100	2.4	962	6.0
	1-31-67)	80	52°	6.9		0	118	770	61	590	0
	1-31-67)		40°	7.25		0	63	320	11	280	0
	4-12-67	80 (10%from this mine)		7.2	1240	0	229	720	1.2	559	4.0
58-024	4-22-65	Dry									
	1-16-67	Dry									
58-025	4-22-65	Dry									
	1-16-67	Dry									
58-026	4-22-65	Dry									
	1-16-67	Dry									
58-027	4-22-65	1	21°	4.1	110	15	0	20	0.1	26	0.7
	1-16-67	1									
58-028	4-22-65	Dry									
	1-16-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
58-031	4-27-65	Dry									
	1-16-67	Dry									
58-041	7-13-65	13.25									
	1-25-67	Dry									
58-046	7-14-65	1.95	21°	5.9	590	24	73	328	11.6	273	1.6
	1-16-67	Dry									
58-051	7-21-65	Dry									
	1-16-67	Dry									
62-002	9-21-65	4	26°	8.0	2600	218	156	1870	2.6	1890	0.8
	1-13-67	3		5.8	2444	20	162	1720	4.0	1508	0
	1-25-67	6.5	53°	6.4		0	172	1600	33	1650	2
62-004	9-21-65	Dry									
	1-13-67	Dry									
62-005	9-21-65	Dry									
	1-13-67	Dry									
62-006	9-22-65	Dry									
	1-13-67	Dry									
62-007	9-21-65				3640	639	6	1492	174.3	2344	20.1
	1-13-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
62-008	9-22-65	8.6	29°	2.8	5500	821	0	2045	108.8	3090	12.1
	1-13-67	6		2.8	5164	880	0	1050	30.0	2600	150.0
	1-26-67	5	52°	2.85		459	0	960	119	3500	15
62-009	9-22-65	Dry									
	1-13-67	Dry									
62-013	9-23-65	2.5	18°	3.3	3000	488	0	1195	76.3	1450	14.0
	1-16-67	2.5		5.5	2100	30	68	1650	103.2	1326	0
	1-26-67	3.7	58°	6.7		0	66	1562	289	1580	1
	1-26-67	1.3	55°	2.85		510	0	1502	98	2100	29
62-015	9-27-65	87.8	18°	3.4	2000	359	0	1180	8.7	1500	15.2
	1-16-67	Seep									
	3- 2-67	1-2									
62-016	9-27-65	Dry									
	1-16-67	Dry									
62-022	9-29-65	Dry									
	1-16-67	Dry									
62-025	9-30-65	Dry									
	1-16-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO4	Al CDTA
62-027	9-30-65	11.2	21°	7.4	1033	94	181	571	8.9	358	1.0
	1-16-67	Seep		3.7	592	50	0	300	1.4	239	5.0
	3- 2-67	Seep									
62-027A	9-30-65	2.3	18°	6.6	1000						
	1-16-67	Seep									
62-035	10- 6-65	Imp.	16°	3.7	2800	263	0	1707	24.9	1805	6.1
	1-16-67	4.5		3.8	2400	300	0	1600	42.0	2080	0
	1-25-67	4	50°	3.0		143	0	1514	61	1850	2
	1-25-67	4	54°	2.7		1010	0	1740	403	3100	7
	1-25-67	27		3.85		71	0	1280	12	1450	64
62-036	10- 6-65	2	19°	2.7	5500	4853	0	1940	0.0	7200	274.0
	1-16-67	Dry									
62-054	10-19-65	20.05	15°	7.2	2000	207	204	1332	10.9	1250	0.3
	1-16-67	4		6.1	2000	10	194	1350	2.4	1300	0
	1-24-67	Total	54°	6.8		0	185	1268	58	1150	0
	1-24-67	flow:	54°	7.0		0	231	1200	18	1050	0
	1-24-67	22.4		5.75		0	39	1454	72	1350	0
	1-24-67			6.5		0	107	1249	44	1100	0
	1-24-67	Imp.	44 1/2°	6.9		0	34	472	2	400	0
62-062	10-26-65	Dry									
	1-16-67	1.5		3.1	2080	320	0	970	12.0	1196	20.0
	1-27-67		44°	7.0		0	92	454	21	380	62

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
62-063	10-26-65	Dry									
	1-16-67	Dry									
62-067	10-27-65	3.2	14°	7.1	2600	139	116	1800	37.2	2060	0.0
	1-16-67	1.5		6.0	2002	0	90	2150	17.0	1560	7.0
	1-24-67	1.6		6.0		0	83	1816	97	1750	0
	1-24-67	Seep		6.75		0	86	1772	33	1750	0
	1-24-67	13.5		7.2		0	282	1176	20	1000	0
	3- 1-67	13		6.0	2100	0	153	1450	31.2	1144	3
63-005	7-27-65	Dry									
	1-16-67	Dry									
63-006	7-27-65	Dry									
	1-12-67	Dry									
62-012	7-28-65	Dry									
	1-12-67	Dry									
62-021	8- 3-65	S.S.	26°	3.5	1000	144	0	541	6.3	575	5.7
	1-12-67	Dry									
63-022	8- 3-65	1	21°	3.2	1700	733	0	700	64.5	1140	50.5
	1-12-67	Seep									
63-023	8- 3-65	Dry									
	1-27-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
63-024	8- 3-65	Dry									
	1-12-67	Dry									
63-031	8- 5-65	Dry									
	1-12-67	Dry									
63-033	8- 6-65	Dry									
	1-12-67	Dry									
63-034	8- 6-65	Dry									
	1-12-67	Seep									
63-035	8-23-65	1	26°	3.0	760	130	0	223	56.5	317	21.7
	1-12-67	Dry									
63-037	8-23-65	Dry									
	1-12-67	S.S.									
63-038	8-23-65	Dry									
	1-12-67	Dry									
63-039	8-23-65	Dry									
	1-12-67	Dry									
63-040	8-23-65	Dry									
	1-12-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
63-041	8-23-65	Dry									
	1-12-67	Dry									
63-042	8-23-65	Dry									
	1-12-67	Dry									
63-044	8-23-65	.9	25°	6.5	300	21	108	81	12.0	42	2.3
	1-12-67	Seep		3.9	760	230	0	350	8.0	325	15.0
63-045	8-23-65	Dry									
	1-12-67	Dry									
63-046	8-23-65	Dry									
	1-12-67	Dry									
63-047	8-23-65	.5	26°	5.2	1500	175	24	913	109.0	1010	6.3
	1-12-67	Seep		4.3	706	60	0	400	26.4	299	4.1
63-048	8-24-65	35	26°	3.3	5500	1170	0	1930	141.0	3440	36.4
	1-13-67	9		2.9	4660	3340	0	1200	216.0	4420	156.0
	1-25-67	7	53°	2.8		959	0	1666	181	3700	30
	1-25-67	0.25	59°	2.63		3539	0	2062	802	8700	53

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO$_4$	Al CDTA
63-049	8-24-65	20	22°	3.2	1980	475	0	859	7.4	1140	57.2
	1-12-67	8		4.3	1382	290	0	760	29.0	702	18.0
				4.2	908	140	0	510	1.4	468	16.0
	1-25-67	3		3.1		265	0	506	22	580	14
	1-25-67	15		3.85		112	0	758	19	950	1
63-050	8-24-65	Dry									
	1-13-67	Dry									
63-051	8-24-65	Dry									
	1-14-67	Dry									
63-052	8-24-65	Dry									
	1-13-67	Dry									
63-053	8-25-65	Dry									
	1-13-67	Dry									
63-054	8-25-65	Dry									
	1-13-67	Dry									
63-055	8-25-65	Dry									
	1-13-67	Dry									
63-056	8-25-65	Dry									
	1-12-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
63-058	8-25-65	Dry									
	1-12-67	Dry									
63-059	8-25-65	Dry									
	1-13-67	Dry									
63-060	8-25-65	Dry									
	1-13-67	Dry									
64-004	1-12-66	Dry									
	3-27-67	Dry									
64-006	1-27-66	8.3	1°	3.6	2800	288	0	820	91.0	1770	8.2
	3-27-67	5		6.0	3340	20	44	450	1.2	1560	0
64-007	1-12-65	Frozen	0°	2.9	5000						
	1-27-65	Dry									
	3-27-67	4.5		2.7	3900	1850	0	1500	444.0	3120	184
	3-27-67		58°	2.5	4980	2730	0	1560	660.0	3393	422.0
64-008	1-13-66	Dry									
	3-27-67	Dry									
64-014	4- 4-66	.8	8°	6.3	2590	0	198	1817	59.5	1531	0.0
	3-22-67	2		6.3	2120	0	229	1640	33.6	1352	21.4

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
64-015	1-18-66	Dry									
	3-28-67	7		2.9	2642	980	0	1610	234.0	2496	56.0
	3-28-67	2.5		2.7	3100	1600	0	1600	372.0	3016	302.0
64-016	1-27-66	3	0°	5.0	2200	106	423	1960	119.0	1640	0.0
	3-22-67	10		6.4	2218	0	204	1520	9.8	1430	22.0
	3-27-67	10		6.0	2500	10	143	1740	69.6	1924	13.4
64-017	1-27-66	.5	1°	5.7	2200	6	160	1490	129.0	1470	0.0
	3-22-67	32		6.4	2040	20	289	1300	34.8	1040	44.2
	3-22-67	26									
64-018	1-18-66	Dry									
	3-28-67	7.5	53°	4.7	2320	280	7	1600	102.0	1768	46.0
	3-28-67	10	53°	5.8	2220	10	77	1600	51.6	1404	51.8
	4-12-67	Dry									
64-019	1-18-66	Dry									
	4-12-67	Dry									
64-020	1-18-66	Seep			2214	0	229	1425	44.3	610	117.3
	3-28-67	12	55°	7.5	2120	0	301	1600	2.4	1222	36.4
	4-12-67	Dry									

* Micromhos

Mine No.	Date	Flow gpm	Temp	pH	Cond*	Acid mg/1	Alk mg/1	Hard EDTA	Fe CDTA	SO_4	Al CDTA
64-022	4- 4-66	44.7	8°	3.1	3420	1010	12	1766	445.6	2495	24.4
	3-28-67	15		2.7	5400	4150	0	1580	1890.0	6630	1810.0
	3-28-67	3.5		3.7	1386	260	0	670	.4	780	15.1
64-023	4- 5-66	4	6°	6.1	2720	0	94	1997	6.9	1534	4.8
	3-28-67	9	55°	6.5	2840	10	118	2190	37.6	1768	29.2

* Micromhos

Table B

STATUS OF MINE SITES

	Mine No.	Date	Flow G.P.M.		Comments
1.	04-060	8-23-65	.2	Low Flow	No further investigation for this Study.
		1-12-67	.5		
2.	04-067	8-24-65	Dry	Dry	" " " " " "
		1-11-67	Dry		
3.	04-068	8-24-65	S.S.	Dry	" " " " " "
		1-11-67	Dry		
4.	04-072	8-25-65	Dry	Dry	" " " " " "
		1-11-67	Dry		
5.	04-080	8-26-65	Dry	Dry	" " " " " "
		1-12-67	Dry		
6.	04-081	8-26-65	Dry	Dry	" " " " " "
		1-11-67	Dry		" " " " " "
7.	04-083	8-26-65	Dry	Dry	" " " " " "
		1-11-67	Dry		
8.	04-085	8-30-65	Dry	Dry	" " " " " "
		1-11-67	Dry		
9.	04-086	8-30-65	Dry	Dry	" " " " " "
		1-11-67	Dry		
10.	04-087	8-30-65	Dry	Dry	" " " " " "
		1-11-67	Dry		

	Mine No.	Date	Flow G.P.M.		Comments
11.	04-105	9- 8-65 1-13-67	.5 S.S.	Low Flow	No further investigation for this Study.
12.	04-111	9- 9-65 1-13-67	Imp. Dry	Dry	" " " " " "
13.	04-119	9-13-65 1-12-67	1.5 Dry	Dry	" " " " " "
14.	04-122	9-14-65 1-12-67	.5 .025	Low Flow	" " " " " "
15.	04-132	9-16-65 1-12-67	Dry Dry	Dry	" " " " " "
16.	12-001	8-30-65 1-17-67	Dry S.S.	Dry	" " " " " "
17.	12-002	8-30-65 1-17-67	Dry Dry	Dry	" " " " " "
18.	12-003	8-30-65 1-17-67	Dry Dry	Dry	" " " " " "
19.	12-004	9- 1-65 1-17-67 1-31-67	75.6 200. 170.	High Flow	High Ph - mineralized - connected to large active mining complex - used as drainway - May be plugged in later operations by Expandable Grout Retainer - No further investigation this Study.

	Mine No.	Date	Flow G.P.M.		Comments
20.	12-005	8-30-65 1-17-67	Dry Dry	Dry	No further investigation for this Study.
21.	12-006	8-30-65 1-17-67	Dry Dry	Dry	" " " " " "
22.	12-007A	8-31-65 1-17-67 2-15-67 1-31-67 3- 1-67	5. 10. 60. 13. 60.	High Flow	Retained for 20 Sites - Part II.
23.	12-007B	3-29-67	25.	High Flow	Retained for 20 Sites - Part II.
24.	12-009	8-31-65 1-17-67	Dry Dry	Dry	No further investigation for this Study.
25.	12-070	11-9-65 1-17-67	.5 .5	Low Flow	" " " " " "
26.	14-003	3-29-67	Seep	Dry	Out of Study Area - May require sealing by remote grouting methods after remedial work on 14-040
27.	14-005	1-21-66 1-18-67	Dry Dry	Dry	No further investigation for this Study.

	Mine No.	Date	Flow G.P.M.		Comments
28.	14-040	2-22-66	5.	High Flow	Retained for 20 Sites - Part I I.
		1-25-67	0.5		
		3-17-67	20.		
		3-17-67	12.		
29.	14-042A	2-22-66	8.	High Flow	Retained for 20 Sites - Part I I.
		1-25-67	1.		
		3- 2-67	1.0-1.5		
		3- 8-67	30.		
		3-17-67	18.		
30.	14-042B	3-22-67	1.	Flow	Retained for 20 Sites - Part I I.
31.	14-044	2-12-66	Dry	Dry	No further investigation for this Study.
		1-25-67	Seep		
32.	16-054	5-18-65	1.		
		1-18-67	Dry		
33.	16-055	5-18-65	Dry	Dry	No further investigation for this Study.
		1-16-67	Dry		
34.	16-056	5-18-65	17.6		
		1-16-67	S.S.		
35.	16-057	5-19-65	Imp.	Dry	No further investigation for this Study.
		1-18-67	Dry		

	Mine No.	Date	Flow G.P.M.		Comments
36.	16-061	5-20-65 1-16-67 1-31-67	S.S. 3.5 3.5	Flow	May require sealing of 2 drifts by remote grouting methods - also grouting of existing seal.
37.	16-063	5-20-65 1-16-67	.5 S.S.	Dry	No further investigation for this Study.
38.	16-064	5-20-65 1-16-67	1. .75		
39.	16-066	5-24-65 1-16-67	Dry Dry	Dry	No further investigation for this Study.
40.	16-073	6- 1-65 1-16-67	Dry Dry	Dry	No further investigation for this Study.
41.	16-076	6- 2-65 1-17-67	Dry Dry	Dry	" " " " " "
42.	16-079	6- 2-65 1-17-67	Imp. Imp.	Dry	" " " " " "
43.	16-080	6- 3-65 1-17-67	Imp. S.S.	Dry	" " " " " "
44.	16-081	6- 3-65 1-17-67	Dry S.S.	Dry	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
45.	16-082	6- 3-65 1-17-67	1. S.S.	Low Flow	No further investigation for this Study.
46.	16-083	6-17-65 1-17-67	S.S. Dry	Dry	" " " " " "
47.	16-084	6- 3-65 1-17-67	Dry Dry	Dry	" " " " " "
48.	16-085	6- 3-65 1-17-67	1. .3	Low Flow	" " " " " "
49.	16-086	6- 3-65 1-17-67	Dry Dry	Dry	" " " " " "
50.	16-087	6- 3-65 1-17-67	Dry Dry	Dry	" " " " " "
51.	16-096	6- 9-65 1-17-67	1. .6	Low Flow	" " " " " "
52.	16-097	6- 9-65 1-17-67	.2 Dry	Dry	" " " " " "
53.	16-098	6- 9-65 1-17-67	Dry Dry	Dry	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
54.	16-099	6- 9-65 1-17-67	0.2 0.1	Low Flow	No further investigation for this Study.
55.	16-100	6- 9-65 1-17-67	.2 Seep	Low Flow	" " " " " "
56.	16-101	6- 9-65 1-17-67	2. Dry	Dry	" " " " " "
57.	16-102	6-10-65 1-17-67	Dry .5	Dry	" " " " " "
58.	16-103	6-11-65 1-17-67	Dry Dry	Dry	" " " " " "
59.	16-104	6-11-65 1-17-67	Dry Dry	Dry	" " " " " "
60.	16-105	6-11-65 1-17-67	Dry Dry	Dry	" " " " " "
61.	16-106	6-11-65 1-17-67	Dry Dry	Dry	" " " " " "
62.	16-108	6-14-65 1-17-67	Dry Dry	Dry	" " " " " "
63.	16-111	7-16-65 1-17-67	.2 Dry	Dry	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
64.	16-112	7-16-65 1-17-67	1. 1.	Low Flow	No further investigation for this Study.
65.	16-113	7-16-65 1-17-67	1. Seep	Low Flow	" " " " " "
66.	16-115	6-16-65 1-17-67	Dry Dry	Dry	" " " " " "
67.	16-117	6-17-65 1-17-67	.2 Seep	Low Flow	" " " " " "
68.	16-118	6-17-65 1-17-67	.2 Seep	Low Flow	" " " " " "
69.	16-119	6-18-65 1-17-67	Dry Dry	Dry	" " " " " "
70.	16-120	6-18-65 1-17-67	Dry Dry	Dry	" " " " " "
71.	16-121	6-18-65 1-17-67	.2 Seep	Low Flow	" " " " " "
72.	16-122	6-18-65 1-25-67	3. Seep	Low Flow	" " " " " "
73.	16-123	6-18-65 1-17-67	Dry Dry	Dry	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
74.	16-124	6-18-65 1-17-67	Dry Dry	Dry	
75.	16-125	6-18-65 1-17-67	Dry Dry	Dry	
76.	16-126	6-18-65 1-17-67	.5 Seep	Low Flow	
77.	16-127	6-22-65 1-17-67	Dry Seep	Dry	
78.	16-128	6-22-65 1-17-67	Dry Dry	Dry	
79.	16-129	6-22-65 1-18-67	Dry Dry	Dry	
80.	16-130	6-22-65 1-18-67	.2 Dry	Dry	
81.	16-131	6-22-65 1-18-67	Dry Dry	Dry	No further investigation for this Study.
82.	16-132	6-22-65 1-18-67	Dry Dry	Dry	
83.	16-133	6-22-65 1-18-67	Dry Dry	Dry	

	Mine No.	Date	Flow G.P.M.		Comments
84.	16-134	6-22-65 1-18-67	Dry Dry	Dry	
85.	16-135	6-22-65 1-18-67	Dry Dry	Dry	
86.	16-139	6-23-65 1-18-67	.2 Dry	Dry	
87.	16-140	6-23-65 1-17-67	.2 Seep	Low Flow	
88.	16-141	6-23-65 1-17-67	Dry Dry	Dry	No further investigation for this Study.
89.	16-142	6-23-65 1-17-67 1-31-67	1. 1.5 1.5	Low Flow	" " " " " "
90.	16-143	6-23-65 1-17-67	.5 Dry	Dry	" " " " " "
91.	16-146	6-28-65 1-18-67	.5 S.S.	Low Flow	" " " " " "
92.	16-147	6-28-65 1-18-67	.5 S.S.	Low Flow	" " " " " "
93.	16-148	6-28-65 1-18-67	.5 S.S.	Low Flow	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
94.	16-149	6-29-65	Dry	Dry	No further investigation for this Study.
		1-17-67	Dry		
95.	16-150	6-30-65	Dry	Dry	" " " " " "
		1-18-67	Dry		
96.	16-152	7- 2-65	Dry	Dry	" " " " " "
		1-17-67	Dry		
97.	40-002	11-4-65	Dry	Dry	" " " " " "
		1-10-67	Dry		
98.	40-004	11-4-65	.5	Dry	" " " " " "
		1-11-67	Dry		
99.	40-005	11-4-65	Dry	High Flow	Retained for 20 Sites - Part II.
		1-11-67	10.		
		1-26-67	11.		
		3-29-67	15.		
100.	40-008	11-4-65	Dry	Dry	No further investigation for this Study.
		1-11-67	Dry		
101.	40-009	11-4-65	Dry	Dry	" " " " " "
		1-11-67	Dry		
		3- 2-67	Dry		
102.	40-013	11-8-65	Dry	Dry	" " " " " "
		1-11-67	Dry		

	Mine No.	Date	Flow G.P.M.		Comments
103.	40-014	11-8-65			
		3- 2-67	No opening	Dry	No further investigation for this Study.
104.	40-015	11-9-65	Dry		
		1-12-67	Dry	Dry	Originally retained for possible pilot - No flow No further investigation for this Study.
		3- 2-67	Dry		
105.	40-016	11-9-65	6.8		
		1-12-67	8		
		1-26-67	15	High Flow	Retained for 20 Sites - Part II.
		3-22-67	150		
106.	40-017	11-9-65	8.2	High Flow	Retained for 20 Sites - Part II.
		1-12-67	15		
		1-27-67	13		
		1-27-67			
107.	40-034	11-18-65	1.6	High Flow	* Portion of Brown's Creek Complex - Mines interconnected with many others covering large area on both East and West side of Brown's Creek in vicinity of Mt. Clare, W. Va. No further investigation as to methods for each individual mine in this complex is required for this study. Suggestion has been made to plug mine openings on East side of Brown's Creek to abate the mine discharge and divert flow, which should tend to be minimal in mineralization to Elk Creek which is out of West Fork Sub-basin. Subsidence is in evidence where stripping is absent at 12' cover line.
		1-10-67	1.3		
		2- 1-67	4.5		
		2- 1-67	2.		
108.	40-036	11-19-65	6.		
		1-11-67	6.5		
		2- 1-67			
		2- 1-67	7.5		
109.	40-037	11-19-65	14.1		
		1-10-67	8.5		
		2- 1-67	8.		
		2- 1-67	8.		

	Mine No.	Date	Flow G.P.M.		Comments
110.	40-040	11-23-65 1-10-67 2- 1-67	33.5 80. 72.	High Flow	* Brown's Creek Complex - See above. No further investigation for this Study.
111.	40-041	11-23-65 1-10-67 2- 1-67	10. 20. 24.	High Flow	* Brown's Creek Complex.
112.	40-042	11-23-65 1-10-67 2- 1-67	3.2 2.6 2.	High Flow	* Brown's Creek Complex.
113.	40-043 (40-042A)	11-23-65 1-10-67 2- 1-67) 2- 1-67)	12. S.S. 15.	High Flow	* Brown's Creek Complex.
114.	40-045	11-23-65 1-11-67	Dry Dry	Dry	No further investigation for this Study.
115.	40-046	11-23-65 1-11-67	120. 100.		
116.	40-051	11-24-65 1-10-67	Dry Dry	Dry	No further investigation for this Study.
117.	40-052	11-29-65 1-10-67 3- 2-67	2.5 Dry 3.	Flow	Connected with 40-053 and 40-054 - Could possibly isolate with remote grouting of connecting drifts. Drift openings might be plugged with remote grouting, creation of ground conditions for subsequent grouting.

	Mine No.	Date	Flow G.P.M.		Comments
118.	40-053	11-29-65	5.5	Flow	
		1-10-67			
		3- 2-67	Dry		
119.	40-054	11-29-65	Dry	Flow	See above.
		1-10-67	2.5		
		1-30-67	0.5		
120.	40-055	11-29-65	Dry	Dry	No further investigation for this Study.
		1-10-67	Dry		
121.	40-058	12- 1-65	1.5	High Flow	Retained for 20 Sites - Part II.
		1-11-67	Seep		
		3- 2-67	19.		
		3- 2-67	20.		
122.	40-063	12- 2-65	6.4	High Flow	Connected to Brown's Creek Complex - No further investigation for this Study - See #107.
		1-11-67	2.5		
		1-27-67)	10.		
		1-27-67)			
123.	40-064	12- 2-65	99.8	High Flow	Brown's Creek Complex - No further investigation for this Study.
		1-11-67	120.		
		1-30-67)	120.		
		1-30-67)			
124.	40-065	12- 2-65	Dry	Dry	No further investigation for this Study.
		1-11-67	Dry		
125.	40-066	12- 2-65	87.2	Flow	Brown's Creek Complex - No further investigation for this Study.
		1-11-67	S.S.		

	Mine No.	Date	Flow G.P.M.		Comments
126.	40-067	12- 3-65	5.5	High Flow	Brown's Creek Complex - No further investigation for this Study.
		1-25-67	4.75		
		2- 1-67	4.		
		2- 1-67	1.5		
127.	40-070	12- 3-65	Dry	Dry	" " " " " "
		1-12-67	Dry		
		3-12-67	Dry		
128.	40-071	12- 3-65	.5	Dry	No further investigation for this Study.
		1-12-67	S.S.		
129.	40-073	12- 3-65	Dry	Dry	" " " " " "
		1-12-67	Dry		
130.	40-074	12- 7-65	14.5		
		3-17-67	Dry	Dry	" " " " " "
		3- 2-67	Dry		
131.	40-075	12- 7-65	4.	Dry	" " " " " "
		1-25-67	Seep		
132.	40-076	12- 7-65	Dry	Dry	" " " " " "
		1-25-67	Dry		
133.	40-077	12- 7-65	20.75	High Flow	Brown's Creek Complex - No further investigation for this Study.
		1-12-67	24.		
		1-27-67	16.		

	Mine No.	Date	Flow G.P.M.		Comments
134.	40-078	12- 9-65	3.	HighFlow	Active - No further investigation for this Study.
		1-12-67	3.		
		1-27167	5.		
135.	40-079	12- 9-65	6.5	High Flow	Brown's Creek Complex - No further investigation for this Study.
		1-13-67	2.		
		1-30-67	2.25		
136.	40-081	12- 9-65	44.85	High Flow	" " " " " "
		1-13-67	Seep		
		1-30-67	7.5		
		1-30-67	24.	Flow	" " " " " "
		1-30-67	Seep		
		1-30-67			
137.	40-083	12- 9-65	Dry		
		1-13-67	3.	Flow	" " " " " "
		1-30-67	3.		
138.	40-085	12- 9-65	26.5	Flow	" " " " " "
		1-13-67	6.		
		1-30-67	20.		
139.	40-087	12-10-65	Dry	Dry	No further investigation for this Study.
		1-19-67	Dry		
140.	40-096	4-12-67	7.5	Flow	Will be stripped out in very near future - No further investigation required for this Study.
141.	58-001	4-19-65	4.5	Low Flow	No further investigation for this Study.
		1-14-67	1.		

	Mine No.	Date	Flow G.P.M.		Comments
142.	58-002	4-19-65	3.55	Low Flow	No further investigation for this Study.
		1-19-67	1.		
143.	58-003	4-19-65	5.	Dry	" " " " " "
		1-14-67	Dry		
144.	58-007	4-20-65	14.25	High Flow	Retained for 20 Sites - Part II.
		1-14-67	.5		
		3- 1-67	15.		
145.	58-010	4-20-65	47.4	High Flow	Retained for 20 Sites - Part II.
	&	1-25-67	.75		With 58-012
	58-012		2.5		
		3- 1-67	30		
		3- 1-67	10		
146.	58-011	4-20-65	5.	Low Flow	No further investigation for this Study.
		1-14-67	S.S.		
147.	58-012	4-20-65	10.	High Flow	Retained for 20 Sites - Part II - with 58-010.
		1-14-67	.5		
		3- 1-67	5.		
148.	58-013	4-21-65	Imp.	Seep	No further investigation for this Study.
		1-14-67	S.S.		
149.	58-014	4-21-65	Dry	Dry	No further investigation for this Study.
		1-14-67	Dry		
150.	58-015	4-21-65	Dry	Dry	" " " " " "
		1-14-67	Dry		

	Mine No.	Date	Flow G.P.M.		Comments
151.	58-016	4-21-65 1-14-67	Dry Dry	Dry	No further investigation for this Study.
152.	58-017	4-21-65 1-16-67 1-31-67) 1-31-67) 4-12-67	87.2 2. 80. 80. (10% this	High Flow	Retained for 20 Sites - Part II.
153.	58-024	4-22-65 1-16-67	Dry Dry	Dry	No further investigation for this Study.
154.	58-025	4-22-65 1-16-67	Dry Dry	Dry	" " " " " "
155.	58-026	4-22-65 1-16-67	Dry Dry	Dry	" " " " " "
156.	58-027	4-22-65 1-16-67	1. 1.	Low Flow	" " " " " "
157.	58-028	4-22-65 1-16-67	Dry Dry	Dry	" " " " " "
158.	58-031	4-27-65 1-16-67	Dry	Dry	" " " " " "
159.	58-041	7-13-65 1-25-67	13.25 Dry	Dry	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
160.	58-046	7-14-65	1.95	Dry	No further investigation for this Study.
		1-16-67	Dry		
161.	58-051	7-21-65	Dry	Dry	" " " " " "
		1-16-67	Dry		
162.	62-002	9-21-65	4.	High Flow	Retained for 20 Sites - Part II.
		1-13-67	3.		
		1-25-67	6.5		
163.	62-004	9-21-65	Dry	Dry	No further investigation for this Study.
		1-13-67	Dry		
164.	62-005	9-21-65	Dry	Dry	" " " " " "
		1-13-67	Dry		
165.	62-006	9-22-65	Dry	Dry	" " " " " "
		1-13-67	Dry		
166.	62-007	9-21-65		Dry	" " " " " "
		1-13-67	Dry		
167.	62-008	9-22-65	8.6	High Flow	Retained for 20 Sites - Part II.
		1-13-67	6.		
		1-26-67	5.		
168.	62-009	9-22-65	Dry	Dry	No further investigation for this Study.
		1-13-67	Dry		

	Mine No.	Date	Flow G.P.M.		Comments
169.	62-013	9-23-65	2.5	Flow	Retained for 20 Sites - Part II.
		1-16-67	2.5		
		1-26-67	3.7		
		1-26-67	1.3		
170.	62-015	9-27-65	87.8	Flow	Redstone Drift, Auger, and Strip. Possibly plug drift opening by creating ground conditions for subsequent grouting. Possible curtain placement.
		1-16-67	Seep		
		3- 2-67	1.2		
171.	62-016	9-27-65	Dry	Dry	No further investigation for this Study.
		1-16-67	Dry		
172.	62-022	9-29-65	Dry	Dry	" " " " " "
		1-16-67	Dry		
173.	62-025	9-30-65	Dry	Dry	" " " " " "
		1-16-67	Dry		
174.	62-027	9-30-65	11.2	Flow	Retained for 20 Sites - Part II.
		1-16-67	Seep		
		3- 2-67	Seep		
175.	62-027A	9-30-65	2.3	Low Flow	No further investigation for this Study.
		1-16-67	Seep		
176.	62-035	10- 6-65	Imp.	Flow	Strip subsequently reclaimed - Flows widespread - No further investigation for this Study.
		1-16-67	4.5		
		1-25-67	4.		
		1-25-67	4.		
		1-25-67	27.		

	Mine No.	Date	Flow G.P.M.		Comments
177.	62-036	10- 6-65	2.	Dry	No further investigation for this Study.
		1-16-67	Dry		
178.	62-054	10-19-65	20.05	Flow	Retained for 20 Sites - Part II.
		1-16-67	4.		
		1-24-67	Total		
		1-24-67	flow:		
		1-24-67	22.4		
		1-24-67	g.p.m.		
		1-24-67	Imp.		
179.	62-062	10-26-65	Dry	Dry	Active Mine - No further investigation for this Study.
		1-16-67	1.5		
		1-27-67			
180.	62-063	10-26-65	Dry	Dry	No further investigation for this Study.
		1-16-67	Dry		
181.	62-067	10-27-65	3.2		
		1-17-67	1.5		
		1-24-67	1.6		
		1-24-67	Seep		
		1-24-67	13.5	High Flow	Retained for 20 Sites - Part II.
		3- 1-67	13.		
182.	63-005	1-27-65	Dry	Dry	No further investigation for this Study.
		1-17-67	Dry		
183.	63-00	[illegible]	Dry	Dry	" " " " " "
		[illegible]	Dry		

	Mine No.	Date	Flow G.P.M.		Comments
184.	63-012	7-28-65 1-12-67	Dry Dry	Dry	No further investigation for this Study.
185.	63-021	8- 3-65 1-12-67	S.S. Dry	Dry	" " " " " "
186.	63-022	8- 3-65 1-12-67	1. Seep	Dry	" " " " " "
187.	63-023	8- 3-65 1-27-67	Dry Dry	Dry	" " " " " "
188.	63-024	8- 3-65 1-12-67	Dry Dry	Dry	" " " " " "
189.	63-031	8- 5-65 1-12-67	Dry Dry	Dry	" " " " " "
190.	63-033	8- 6-65 1-12-67	Dry Dry	Dry	" " " " " "
191.	63-034	8- 6-65 1-12-67	Dry Dry	Dry Seep	" " " " " "
192.	63-035	8-23-65 1-12-67	1. Dry		" " " " " "
193.	63-037	8-23-65 1-12-67	Dry S.S.	Dry	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
194.	63-038	8-23-65 1-12-67	Dry	Dry	No further investigation for this Study.
195.	63-039	8-23-65 1-12-67	Dry Dry	Dry	" " " " " "
196.	63-040	8-23-65 1-12-67	Dry Dry	Dry	" " " " " "
197.	63-041	8-23-65 1-12-67	Dry Dry	Dry	" " " " " "
198.	63-042	8-23-65 1-12-67	Dry Dry	Dry	" " " " " "
199.	63-044	8-23-65 1-12-67	.9 Seep	Dry	" " " " " "
200.	63-045	8-23-65 1-12-67	Dry Dry	Dry	" " " " " "
201.	63-046	8-23-65 1-12-67	Dry	Dry	" " " " " "
202.	63-047	8-23-65 1-12-67	.5 Seep	Low Flow	" " " " " "
203.	63-048	8-24-65 1-13-67 1-25-67 1-25-67	35. 9. 7. 0.25	Flow	Active Mine - No further investigation this Study.

	Mine No.	Date	Flow G.P.M.		Comments
204.	63-049-1	8-24-65 1-12-67	20. 8.	High Flow	State Hospital - Possible remedial measures include repairing WPA seal with remote grouting methods. No further investigation for this Study. Same as above - No further investigation for this Study.
	63-049-2	1-25-67 1-25-67	3. 15.	High Flow	
205.	63-050	8-24-65 1-13-67	Dry Dry	Dry	No further investigation for this Study.
206.	63-051	8-24-65 1-14-67	Dry Dry	Dry	" " " " " "
207.	63-052	8-24-65 1-13-67	Dry Dry	Dry	" " " " " "
208.	63-053	8-25-65 1-13-67	Dry Dry	Dry	" " " " " "
209.	63-054	8-25-65 1-13-67	Dry Dry	Dry	" " " " " "
210.	63-055	8-25-65 1-13-67	Dry Dry	Dry	" " " " " "
211.	63-056	8-25-65 1-12-67	Dry Dry	Dry	" " " " " "
212.	63-058	8-25-65 1-12-67	Dry Dry	Dry	" " " " " "
213.	63-059	8-25-65 1-13-67	Dry Dry	Dry	" " " " " "

	Mine No.	Date	Flow G.P.M.		Comments
214.	63-060	8-25-65 1-13-67	Dry Dry	Dry	No further investigation for this Study.
215.	64-004	1-12-66 3-27-67	Dry Dry	Dry	" " " " " "
216.	64-006	1-27-66 3-27-67	8.3 5.	Flow	Active Mine - if abd could be plugged by remote methods, first utilizing spraying of drifts and remote bulkhead placement.
217.	64-007	1-12-65 1-27-65 3-27-67	Frozen Dry 4.5	Flow	Possibly corrected by use of Expendable Grout Retainers and remote grouting methods - Also could possibly create ground conditions for subsequent grouting application.
218.	64-008	1-13-66 3-27-67	Dry Dry	Dry	No further investigation for this Study.
219.	64-013			Strip	No further investigation for this Study.
220.	64-014	4- 4-66 3-22-67	.8 2.	Flow	Retained for 20 Sites - Part II - with 64-016; 64-017.
221.	64-015	1-18-66 3-28-67 3-28-67	Dry 7. 2.5	Flow	Retained for 20 Sites - Part II.
222.	64-016	1-27-66 3-22-67 3-27-67	3. 10. 10.	Flow	Retained for 20 Sites - Part II with 64-014 and 64-017

	Mine No.	Date	Flow G.P.M.		Comments
223.	64-017	1-27-66 3-22-67	.5 1) 32. 2) 26.	Flow	Retained for 20 Sites - Part II with 64-014 and 64-016
224.	64-018	1-18-66 3-28-67 3-28-67 4-12-67	Dry 7.5 10. Dry	Flow	Retained for 20 Sites - Part II with 64-020 (also 64-019)
225.	64-019	1-18-66 4-12-67	Dry Dry	Dry	No further investigation for this Study. (May be included with 64-018 and 64-020)
226.	64-020	1-18-66 3-28-67 4-12-67	Seep 12. Dry	Flow	Retained for 20 Sites - Part II with 64-018 (also 64-019)
227.	64-022	4- 4-66 3-28-67 3-28-67	44.7 15. 3.5	Flow	Active Mine - No further investigation required.
228.	64-023	4- 5-66 3-28-67	4. 9.	Flow	Possible corrective measures include locating obliterated drift and plugging by remote grouting methods as access is difficult - Subsequent grouting of highwall may be required. No further investigation required.

Table C

COMPARATIVE ACID AND IRON LOADS AT

TWENTY SITES SELECTED

Mine Number	Monongahela Enforcement Project Survey Sept. 1965 to Jan. 1966 Lb per Day		Surveyed Jan. 1967 Lb per Day		Resurveyed Jan-Feb-Mar. 1967 Lb per Day	
	Acid	Fe	Acid	Fe	Acid	Fe
12-007A	9	1	0	1	7.2	3.2*
12-007B	-	-	-	-	0	0
14-040	73	16	5.8	1.2	542*	126.5*
14-042A	54	12	30	6.5	722*	150*
14-042B	-	-	-	-	30	6.5
40-005	0	0	2.9	0.9	27	2.0*
40-016	79	14	82.5	11.5	55.1	27.2
40-017	103	17	308	93	270	89.5
40-058	12.2	0.4	1.2	0.4	0.3	0.1
58-007	28	7	-	-	47	6
58-010, 58-012	19	2	7.1	0.9	25.9	0.9
58-017	18	5	3.6	0.3	0	0.3
62-002	3	0	0.8	0.2	0	2.5
62-008	85	11	53	1.8	27.5	7.1
62-013	15	2	0.9	3.2	6.6	3.6*
62-054	1	3	0.5	0.2	0	5.3*
62-067	1	1	0	0.3	0	2.5*
64-014, -016, -017	3.9	2.6	-	-	7.7	5.1
64-015	0	0	-	-	65.4	15.4*
64-018, -019, -020	0	0	-	-	13.2	8.0
TOTAL CALCULATED LOADS, LB PER DAY	504.1	94.0	496.3	121.4	1846.9	461.7

*Average of two measurements.

MINE INVENTORY CHECK LISTS AND SKETCHES

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 12-007A

Date January 17, 1967

Sampler Siems & Fleischman

Time 1:15 P.M.

Location

State W. Va.

County Upshur

TWP Warren

Section

Coord. 39°03.7' N 80°12.5' W

39°03.7' 80°12.5' W

Map Reference Philippi 7 1/2'

R.M.I.

Receiving Stream Hackers Creek

Company Name or Owner Hackers Creek Coal Co.

Coal Designation Redstone

Elev. 1440 Area Mined

Reserves

Mining Method Strip Drift (abd)

Sample Number 12-007 1 - water
1 - gob

Surface, Ground, or Impoundment Ground

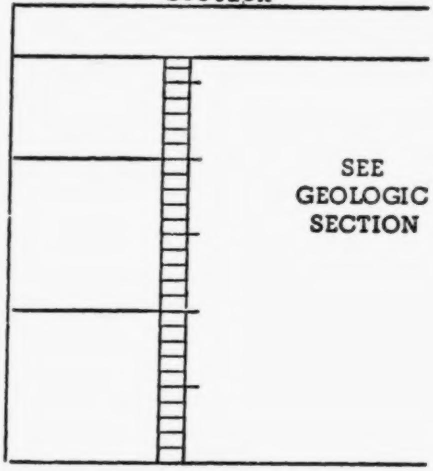
Estimate of Flow See below

Measurement of Flow 10 gpm

pH Temp. Spec. Cond.

Notes: Total flow from two openings: 10 gpm. Yellow boy present. Mine buildings and plant apparatus abandoned. Easy access. Impounded water at entrances due to gob pile which prevents drainage.

Section



MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 12-007A

Date January 31, 1967

Sampler Eichner, Choy, Siems, Fleischman, Hsia

Time 9:45 A.M. Air Temp. 41°F

Location

State W. Va.

County Upshur

TWP Warren

Section

Coord. 39° 03.7'N 80° 12.5'W

Map Reference Philippi 7 1/2'

R.M.I.

Receiving Stream Hackers Creek

Company Name or Owner Hackers Creek Coal Co.

Coal Designation Redstone

Elev. 1440 Area Mined

Reserves

Mining Method Strip and Drift (abd)

Sample Number 12-007-2

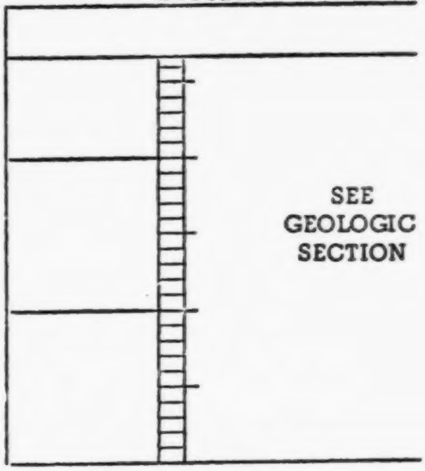
Surface, Ground, or Impoundment Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

Measurement of Flow Total of 13 gpm

pH Water Temp. 54° Spec. Cond.

Section



Notes:

The total flow from two drainage channels is 13 gpm. The water seems to be all mine water which is impounded at mine entrance because of gob pile. The mine buildings and plant apparatus are abandoned; however, this was a large operation at one time. The accessibility is excellent. The area above the highwall was not investigated because it was snow covered and inaccessible.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

ORIGINAL & RESURVEY COMBINED

MINE No. 12-007B

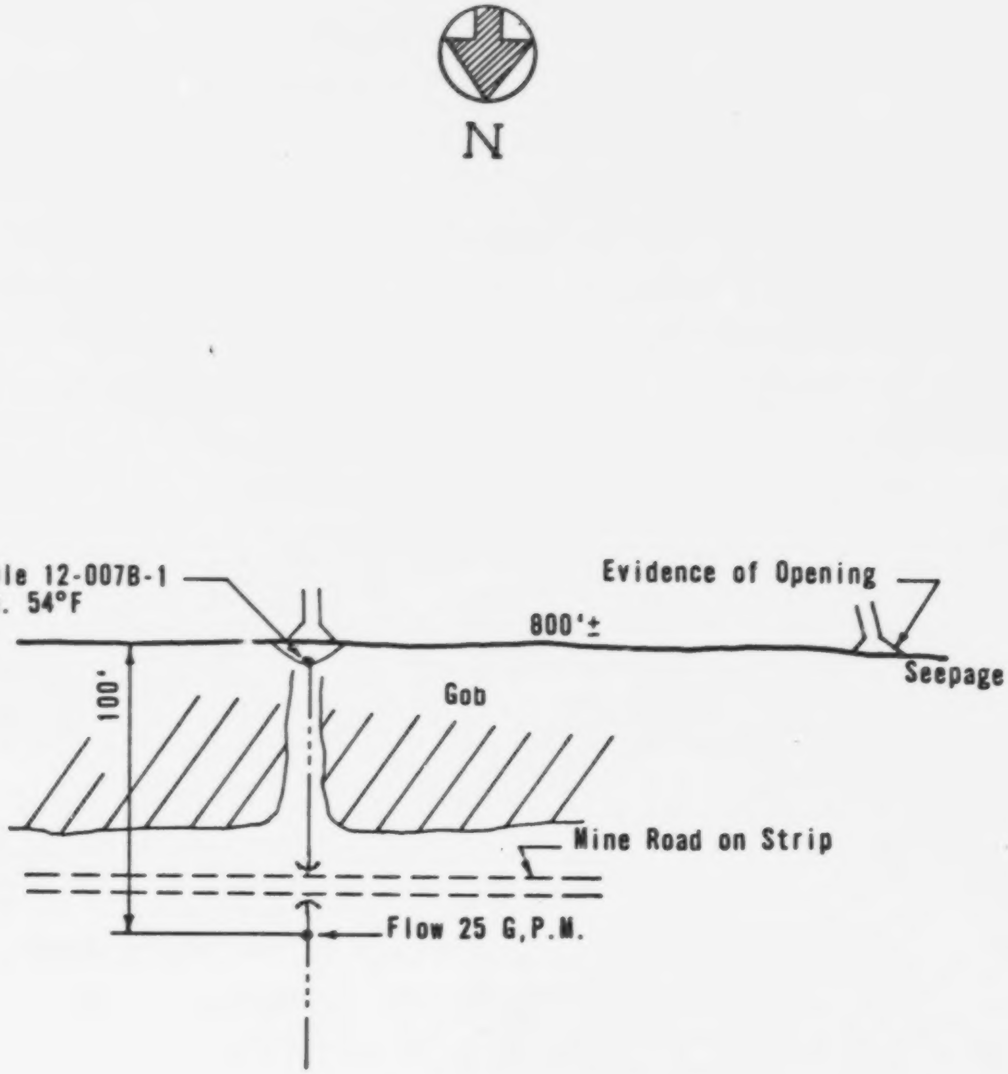
Date March 29, 1967
Sampler Siems & Choy
Time 10:00A.M. Air Temp. 52° F
Location
State W. VA.
County Upshur
TWP Warren
Section
Coord. 39° 3.7'N 80° 13'W
Map Reference Phillippi 7 1/2'
R.M.I.
Receiving Stream Hacker's Creek
Company Name or Owner Hackers Creek Coal Co.

Coal Designation Redstone
Elev. 1440' Area Mined
Reserves
Mining Method Drift (abd.)
Sample Number 12-007B-1
Surface, Ground, or Impoundment Ground
Estimate of Flow
Measurement of Flow 25 gpm P & B
pH Temp. 54° Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: Water draining through sloughed-over entrance. Large amounts of gob all over area. Area is accessible.


N
Sample 12-007B-1
Temp. 54°F
Evidence of Opening
800'±
Seepage
100'
Gob
Mine Road on Strip
Flow 25 G,P.M.

SKETCH - MINE NO. 12-007B

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 14-040

Date January 25, 1967

Sampler H. Sterner & L.M. Hsia

Time 9:00 A.M.

Location

State W. Va.

County Harrison

TWP Clark

Section

Coord. 39°15.7' N 80° 21.4' W

Map Reference Clarksburg 7 1/2'

R.M.I.

Receiving Stream West Fork River

Company Name or Owner Paul Serother ?

Coal Designation Pittsburgh (6')

Elev. 1140'

Area Mined

Reserves

Mining Method Drift

Sample Number 14-040 gob sample
14-040-1 water sample

Surface, Ground; or Impoundment

Estimate of Flow

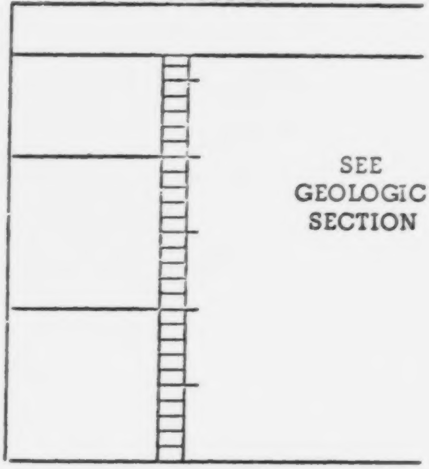
Measurement of Flow 0.5 GPM

pH

Temp.

Spec. Cond.

Section



Notes: Small drift mine with four openings caved in. Two subsidence holes over drifts may cause surface water to enter the mines. Mine water drains.

MONONGAHELA RIVER MINE DRAINAGE
REMEDIAL PROJECT
MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 14-040

Date March 17, 1967

Sampler Baker, White, & Thompson

Time

Location

State W. Va.

County Harrison

TWP Clark

Section

Coord.

Map Reference Clarksburg 7 1/2'

R.M.I.

Receiving Stream West Fork River

Company Name or Owner

Coal Designation Pittsburgh

Elev. 1140' Area Mined

Reserves

Mining Method Drift

Sample Number 14-040-1 & 14-040-2

Surface, Ground, or Impoundment Ground

Estimate of Flow

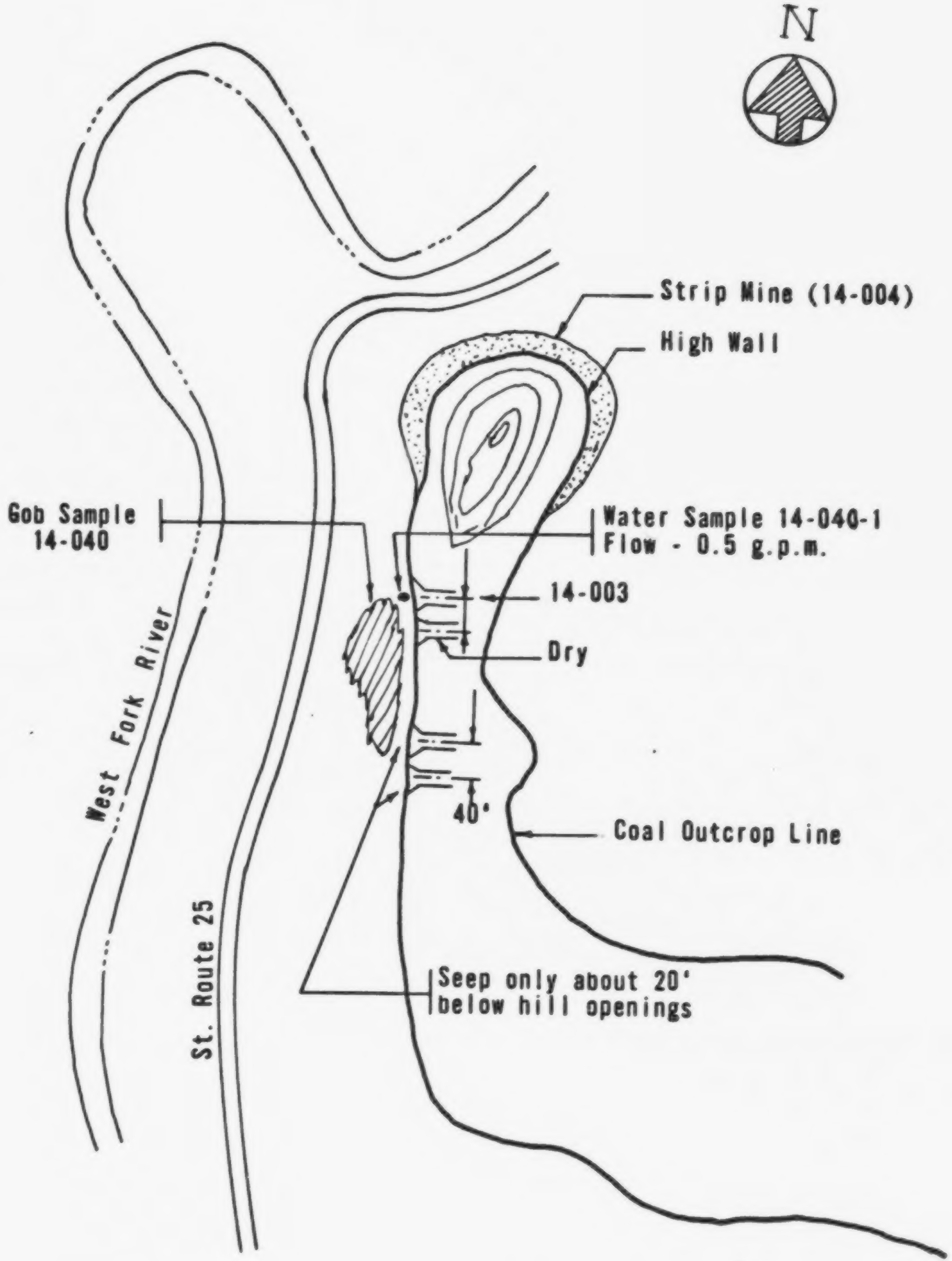
Measurement of Flow 14-040-1 - 20 gpm
14-040-2 - 12 gpm

pH Temp. Spec. Cond.

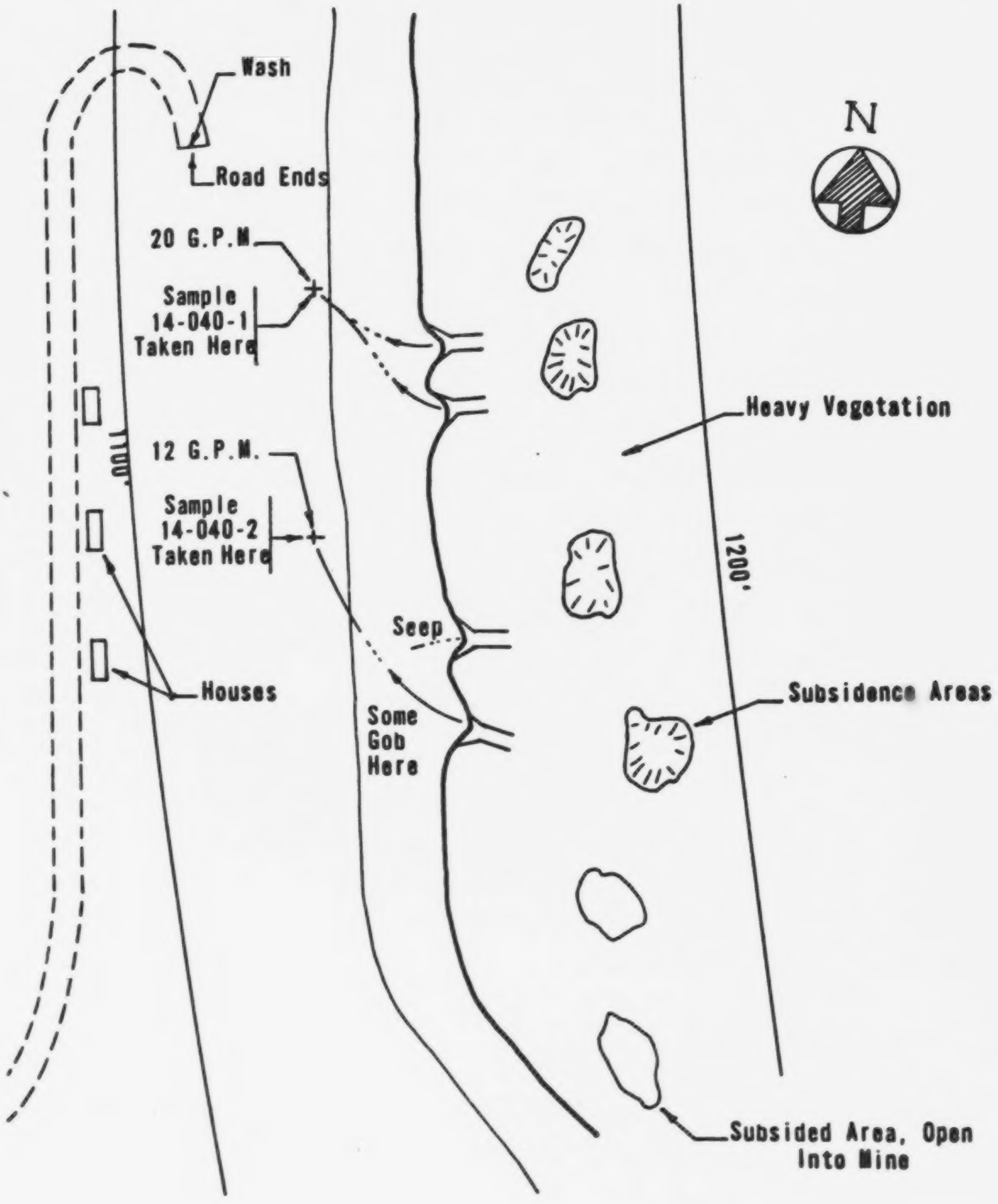
Section

SEE GEOLOGIC SECTION

Notes: Found four openings, all caved in and all wet. Heavy subsidence all around hill, heavy vegetation. Access fair. Some gob scattered but not much that would be usable.


N
Strip Mine (14-004)
High Wall
Gob Sample
14-040
Water Sample 14-040-1
Flow - 0.5 g.p.m.
14-003
Dry
40'
Coal Outcrop Line
West Fork River
St. Route 25
Seep only about 20'
below hill openings

SKETCH - MINE NO. 14-040


Wash
Road Ends
N
20 G.P.M.
Sample 14-040-1 Taken Here
1100'
12 G.P.M.
Sample 14-040-2 Taken Here
Heavy Vegetation
1200'
Seep
Houses
Some Gob Here
Subsidence Areas
Subsided Area, Open Into Mine

SKETCH - MINE NO. 14-040

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 14-003

(East opening of 14-040)

Date March 29, 1967

Sampler Siems, Choy

Time 1:30 P.M. Air Temp. 64°F

Location

State W. Va.

County Harrison

TWP Clark

Section

Coord.

Map Reference Clarksburg 7 1/2'

R.M.I.

Receiving Stream Arnold Run (Below Dam)

Company Name or Owner Consolidation Coal Company

Coal Designation Pittsburgh

Elev. 1180' ± Area Mined

Reserves

Mining Method Drift abandoned

Sample Number None taken

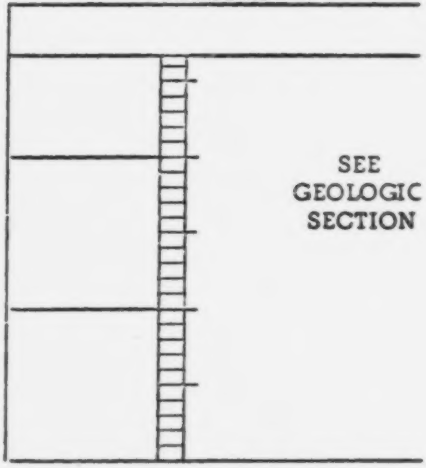
Surface, Ground, or Impoundment

Estimate of Flow Seep (not measurable)

Measurement of Flow See notes.

pH Temp. Spec. Cond.

Section



Notes: At mine opening 14-003, mine seal 81/1 was located; however, mine drainage was flowing at the rate of about 30 gpm. Subsidence was in evidence around this opening. No openings located north of this opening (14-003). Southeast of this opening is a sloughed-over opening which is seeping (no measureable amount of flow). Entire area is in grazing land.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 14-042A

Date January 25, 1967

Sampler H. Sterner, L. M. Hsia

Time 9:55 A.M.

Location

State W. Va.

County Harrison

TWP

Section

Coord. 39° 15.1'N 80° 21.7'W

Map Reference Clarksburg 7 1/2'

R.M.I.

Receiving Stream Doll Run

Company Name or Owner Bill Herderson (?)

Coal Designation Pittsburgh (5' - 6')

Elev. 1140'

Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 14-042 gob sample
14-042-1 water sample

Surface, Ground, or Impoundment Ground

Estimate of Flow

Measurement of Flow 1 gpm

pH

Temp.

Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: Wet farm drift mine. Opening 3' x 6'. Water is visible in mine and approximately 1' - 2' deep; water flows over a barrier at mine opening. Measured at 1 gpm; previously reported at 8 gpm.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY MINE No. 14-042 A

Date March 17, 1967 Sampler Baker, White, & Thompson

Time 10:00 A.M. Location

State West Virginia County Harrison TWP Clark

Section Coord. 39° 15.1'N 80° 21.7'W

Map Reference Clarksburg 7 1/2 R.M.I.

Receiving Stream Doll Run

Company Name or Owner Penn Coal Company (?)

Coal Designation Pittsburgh

Elev. 1140' Area Mined

Reserves

Mining Method Drift (and 14-041 Partial Strip)

Sample Number

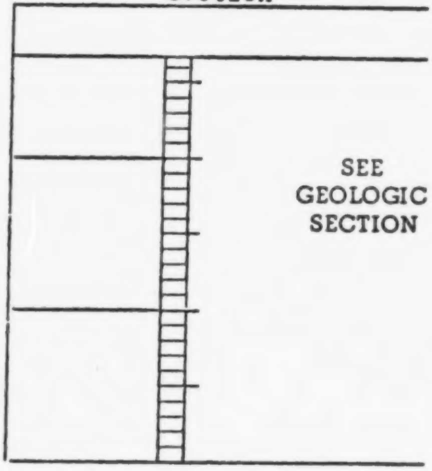
Surface, Ground, or Impoundment Ground

Estimate of Flow

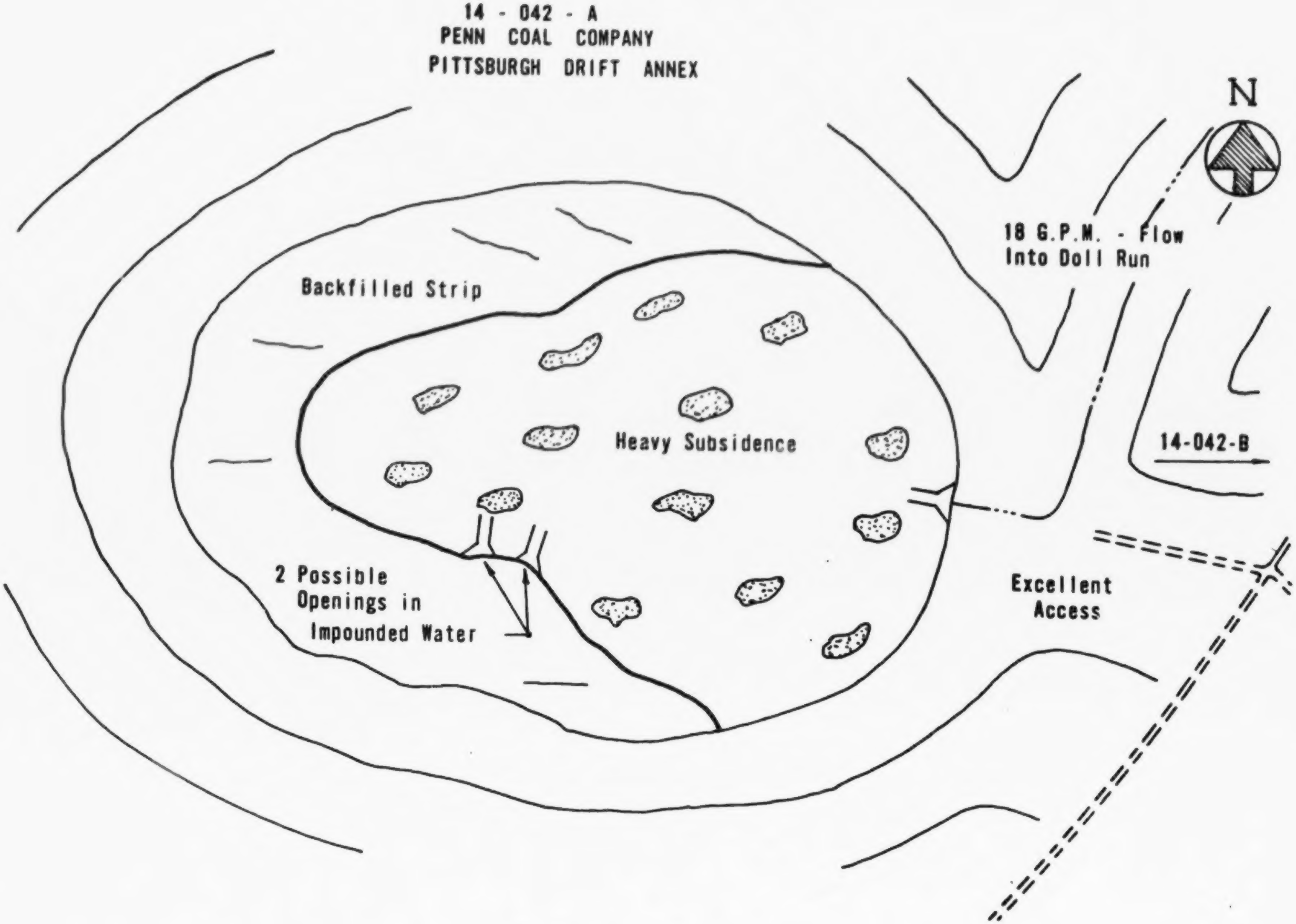
Measurement of Flow 18 gpm (Pipe & Bucket)

pH Temp. Spec. Cond.

Section



Notes: This mine appears on the east end of strip mine 14-041. The structure is an island which has been stripped on three sides. The mine opening is on the remaining side. Heavy subsidence is in evidence all around the base of this small knob and also on up toward the crest. There is a small gob pile that has been graded adjacent to the mine mouth. The mine mouth is open and the roof looks to be in fair shape. This mine seems to be ideal for a pilot project. Access is very good and very little dozer work would be required to move in drilling and pumping equipment. This mine was also sampled on March 8, after a heavy rain and was flowing at the rate of 30 gpm at that time.


14 - 042 - A
PENN COAL COMPANY
PITTSBURGH DRIFT ANNEX
N
18 G.P.M. - Flow Into Doll Run
Backfilled Strip
Heavy Subsidence
14-042-B
Excellent Access
2 Possible Openings in Impounded Water

SKETCH - MINE NO. 14-042A

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 14-042 B

Date March 2, 1967

Sampler White, Siems

Time

Location

State W. Va.

County Harrison

TWP Clark

Section

Coord.

Map Reference Clarksburg 7 1/2'

R.M.I.

Receiving Stream Doll Run-Area has been extensively regraded.

Company Name or Owner

Coal Designation Pittsburgh

Elev.

Area Mined

Reserves

Mining Method Drift

Sample Number

Surface, Ground, or Impoundment Ground

Estimate of Flow 1.0 - 1.5 gpm

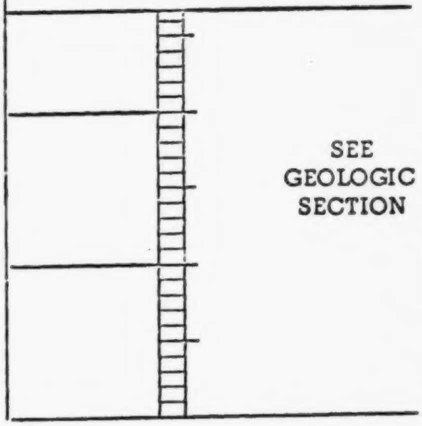
Measurement of Flow

pH

Temp.

Spec. Cond.

Section



Notes: This mine appears on the East end of strip mine 14-041, which is an island. (Quad sheet does not indicate this.) Water is seeping at the Pittsburgh level. Heavy subsidence is in evidence at the apparent opening and adjacent thereto. It appears that the gob pile was deposited in the area of the drainage causing the seepage area to appear to be slipping. Access is good.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 14-042B

RESURVEY

Date March 22, 1967

Sampler White & Thompson

Time 4:30 P.M.

Location

State W. VA.

County Harrison

TWP Clark

Section

Coord. 39° 15.1'N 80° 21.7'W

Map Reference Clarksburg 7 1/2'

R.M.I.

Receiving Stream West Fork River

Company Name or Owner Penn Coal (?)

Coal Designation Pittsburgh

Elev. 1175' Area Mined

Reserves

Mining Method Drift & Strip

Sample Number 14-042B

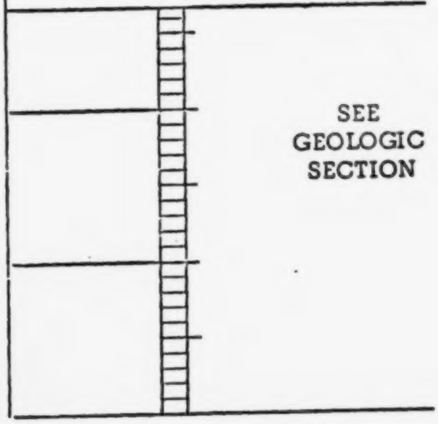
Surface, Ground, or Impoundment

Estimate of Flow 14-042B-2 - 3 gpm
14-042B-1 - 1 gpm (Pipe & Bucket)

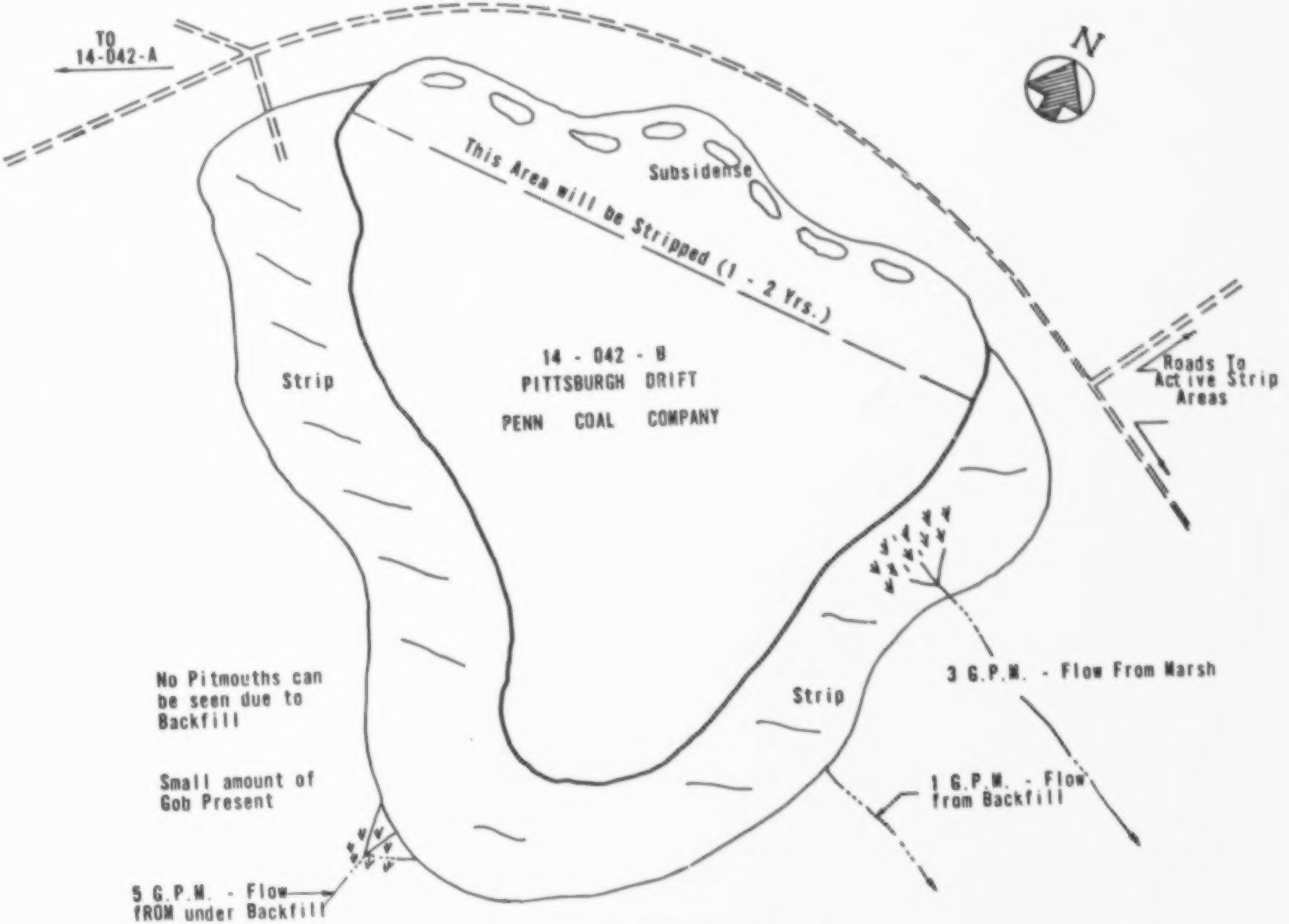
Measurement of Flow

p^H Temp. Spec. Cond.

Section



Notes: There were two flows on this mine but only one sample was taken. This is a small isolated island that has been extensively drift mined and stripped on the south and east sides where the flows were recorded. The strip operator working in that area also plans to strip the north side sometime in the future, but not for at least a year or so. On the north and the west sides that have not been stripped, there is heavy subsidence. This subsidence is also in evidence on the south and east sides. The access to this mine is excellent and in close proximity to Clarksburg. There is no gob present on the site; it was evidently removed during the stripping operation.


N
TO 14-042-A
Subsidense
This Area will be Stripped (1 - 2 Yrs.)
14 - 042 - B
PITTSBURGH DRIFT
PENN COAL COMPANY
Strip
Strip
Roads To Active Strip Areas
No Pitmouths can be seen due to Backfill
Small amount of Gob Present
3 G.P.M. - Flow From Marsh
1 G.P.M. - Flow from Backfill
5 G.P.M. - Flow FROM under Backfill

SKETCH - MINE NO. 14-042B

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 40-005

Date January 11, 1967

Sampler Siems and Fleischman

Time 9:00 A.M.

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 23.2'N 80° 21.5' W
39° 08.3'N 80° 21.5' W

Map Reference Mt. Clare 7 1/2'

R.M.I.

Receiving Stream Unnamed tributary to Lost Creek and McKinney's Run

Company Name or Owner Jack A. Shock

Coal Designation Redstone

Elev. 1420' Area Mined

Reserves

Mining Method Drifts (ABD)

Sample Number 40-005

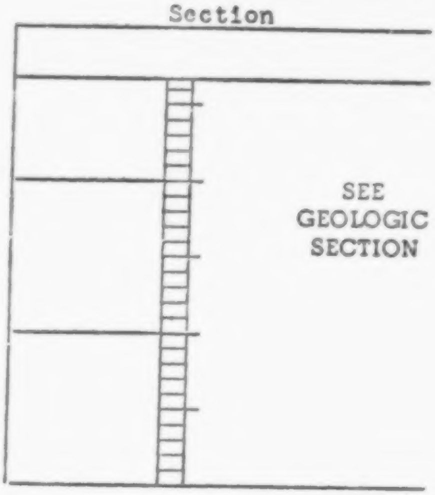
Surface, Ground, or Impoundment Ground

Estimate of Flow

Measurement of Flow 10 gpm (P&B)

pH Temp. Spec. Cond.

Section



Notes: The eleven (11) drift openings appear to be closed. However, recent stripping operations appear to have opened three existing corridors and from one of these a flow of 10 gpm was measured. One dry and one water sample were taken. Area is accessible.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 40-005

Date January 26, 1967

Sampler Eichner, Choy, Siems, Fleischman, Hsia, Sterner

Time 1:00 P.M. Air Temp. 67°

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 23.2' N 80° 21.5' W
39° 08.3' N 80° 21.5' W

Map Reference Mt. Clare 7 1/2'

R.M.I.

Receiving Stream Unnamed tributary to Lost Creek and McKinney's Run

Company Name or Owner Jack A. Shock

Coal Designation Redstone and Pittsburgh

Elev. 1420' Area Mined

Reserves

Mining Method Redstone (drift) & Pittsburgh (strip)

Sample Number 40-005-1

Surface, Ground, or Impoundment Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

Measurement of Flow 11 gpm

pH Water Temp. 54°F Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: The openings are in Redstone. However, the drainage is coming through the Pittsburgh seam which has been stripped. Unless there have been Pittsburgh drifts in this area, this mine should probably be disregarded because of the type of drainage present. The access is good. There was no subsidence above the highwall.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY OF NORTHWEST OPENINGS MINE No. 40-005

Date March 29, 1967 Sampler Siems - Choy

Time 11:30 A.M. Air Temp. 54° Location

State W. VA. County Harrison TWP Grant

Section Coord. 39°08.4' N 80°21.4' W

Map Reference Mt. Clare 7 1/2' R.M.I.

Receiving Stream Unnamed tributary to Lost Creek

Company Name or Owner Calif Mine

Coal Designation Pittsburgh Strip & Redstone Drift

Elev. 1400' Area Mined

Reserves

Mining Method Drift (Abd)

Sample Number 40-005-1

Surface, Ground, or Impoundment Ground

Estimate of Flow

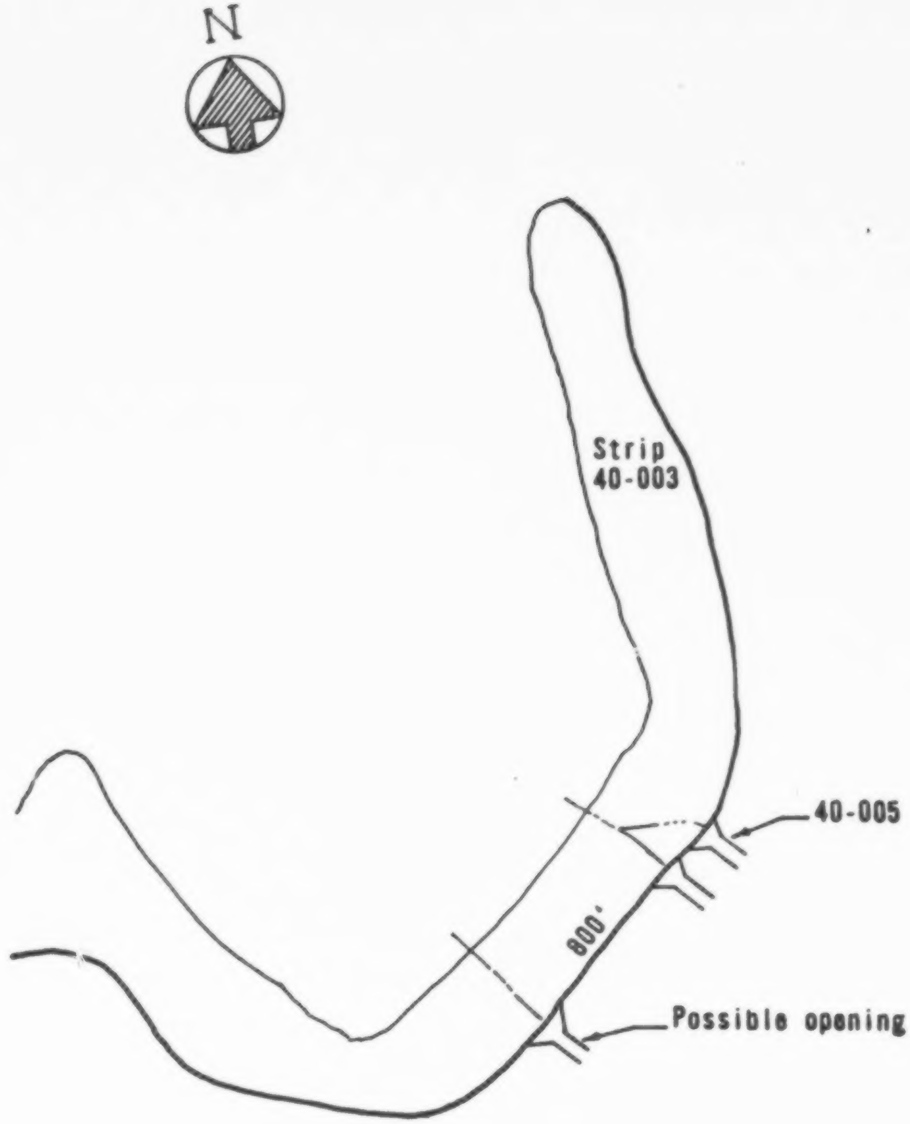
Measurement of Flow 15gpm Pipe and Bucket

pH Temp. 54° Spec. Cond.

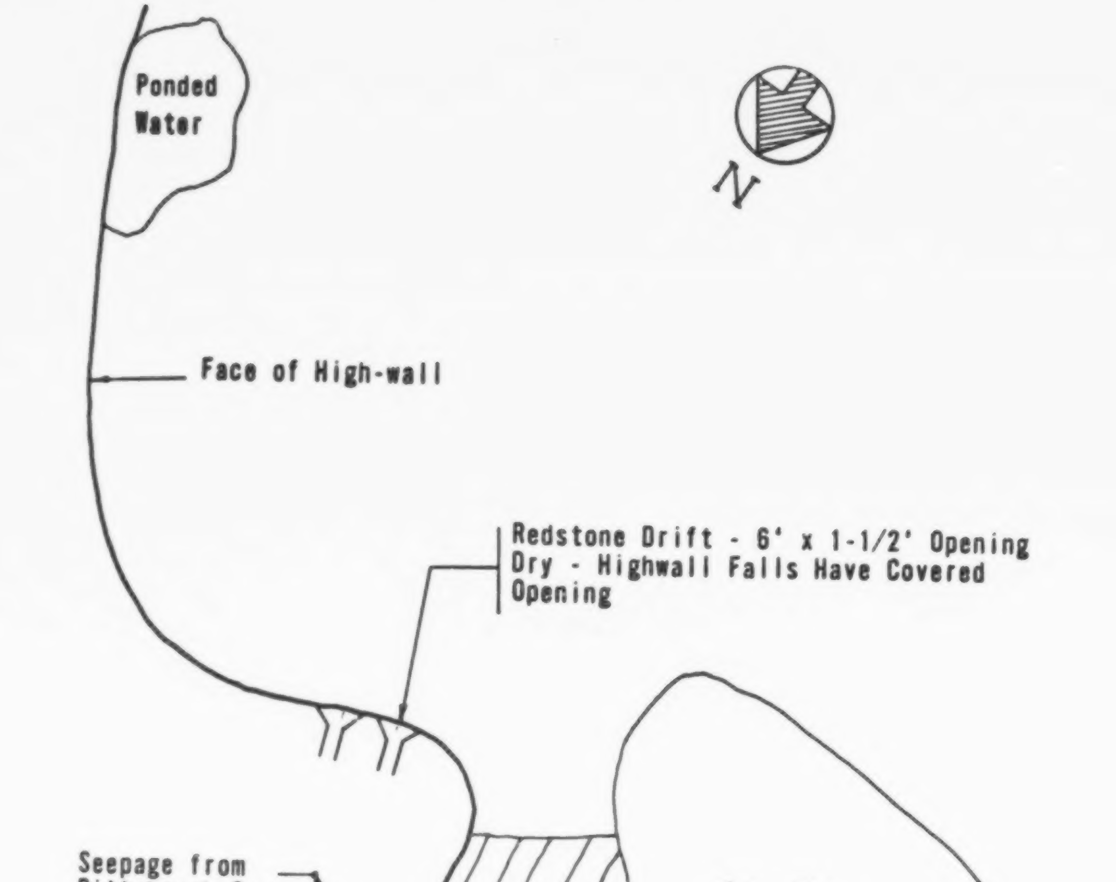
Section

SEE GEOLOGIC SECTION

Notes: One possible opening located on north-west highwall in addition to the two openings at 40-004. (The two openings at 40-004 are closed but draining; approximate combined flow is 10-15 gpm.) Water is ponded 100' x 15'. Reclaimed land slopes to face of high wall. Identification of opening is difficult. Water sample taken 20' from face of highwall. Probable opening is 700-800' SW of 40-004. Access is good.


N
Strip
40-003
40-005
800'
Possible opening

SKETCH - MINE NO. 40-005


Ponded Water
N
Face of High-wall
Redstone Drift - 6' x 1-1/2' Opening Dry - Highwall Falls Have Covered Opening
Seepage from Pittsburgh Seam
Gob Pile
Pittsburgh Strip
Water Sample 40-005-1 (54°F)
Water Flow 11 G.P.M.
250'
MINE ROAD

SKETCH - MINE NO. 40-005

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 40-016

Date January 12, 1967

Sampler Siems & Fleischman

Time 10:00 A.M.

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 11.2' N 80° 22.7' W
39° 11.2' N 80° 22.2' W

Map Reference Mt. Clare 7 1/2'

R.M.I.

Receiving Stream Unnamed Trib. To Lost Creek

Company Name or Owner Tasa Coal Co. (Operator) Maxwell Heirs (Landowner)

Coal Designation Pittsburgh

Elev. 1350' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 40-016 1 Water 1 Gob

Surface, Ground, or Impoundment

Estimate of Flow

Measurement of Flow 8 gpm Pipe and Bucket

p^H Temp. Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: There are two drift mine openings approximately 100 yards apart. Both portals have caved in. Both portals are draining and the accumulated flow is 8 gpm. Approximately 200 yards south of the openings, seepage flow is estimated at 0.5 gpm. Mine openings are accessible.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 40-016

Date January 26, 1967

Sampler Eichner, Choy, Siems, Fleischman, Sterner, Hsia

Time 3:15 P.M. Air Temp. 68° F

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 11.2' N 80° 22.7' W
39° 11.2' N 80° 22.2' W

Map Reference Mt. Clare 7 1/2'

R.M.I.

Receiving Stream Unnamed Trib. To Lost Creek

Company Name or Owner Tasa Coal Co. (Strip Operator), Don Garry Coal Co. (Drift Operator)

Porter and Brent Maxwell Heirs (Landowner)

Coal Designation Pittsburgh and Redstone

Elev. 1350'

Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 40-016-1

Surface, Ground, or Impoundment

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

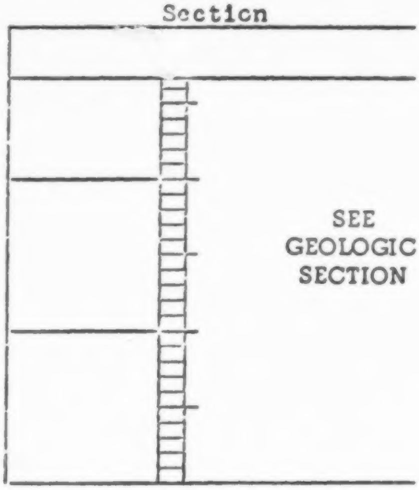
Measurement of Flow 15 gpm

pH

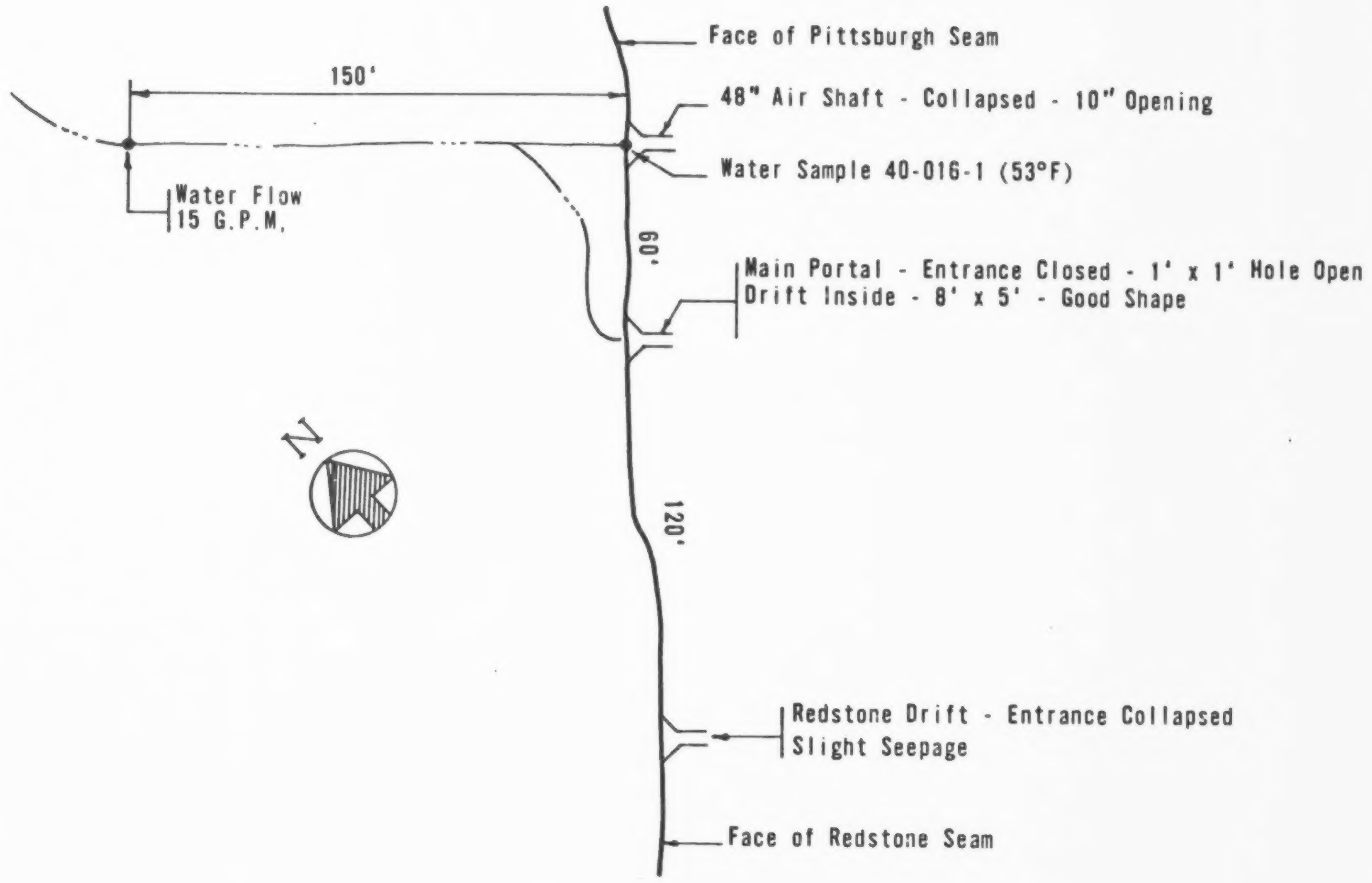
Water Temp. 53° F

Spec. Cond.

Section



Notes: There are two small openings in the Pittsburgh seam. The Redstone drift is located 120' S.W. of the main Pittsburgh opening. The access to this mine is very good. No subsidence.



Face of Pittsburgh Seam
150'
48" Air Shaft - Collapsed - 10" Opening
Water Sample 40-016-1 (53°F)
Water Flow
15 G.P.M.
60'
Main Portal - Entrance Closed - 1' x 1' Hole Open
Drift Inside - 8' x 5' - Good Shape
N
120'
Redstone Drift - Entrance Collapsed
Slight Seepage
Face of Redstone Seam

SKETCH - MINE NO. 40-016

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 40-017

Date January 12, 1967

Sampler Siems and Fleischman

Time 9:15 A.M.

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 11.2' N 80° 21.6' W
39° 11.1' N 80° 21.6' W

Map Reference Mt. Clare 7 1/2'

R.M.I.

Receiving Stream Unnamed Trib. To Lost Creek

Company Name or Owner A. R. Crumrine - Central #7 (Operator) - I. D. Stout (Landowner)

Coal Designation Pittsburgh

Elev. 1350' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 40-017 1 Water 1 Gob

Surface, Ground, or Impoundment Ground

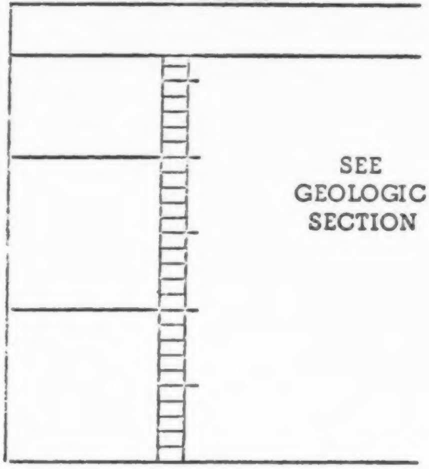
Estimate of Flow

Measurement of Flow 15 gpm Pipe and Bucket

pH Temp. Spec. Cond.

Notes: Mine openings are closed but are draining. Water flow measurements taken below confluence of mine opening drainways. Mine openings are accessible.

Section



MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 40-017

Date January 27, 1967

Sampler Choy, Siems, Fleischman, Sterner, Hsia

Time 4:00 P.M. Air Temp. 68°

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 11.2' N 80° 21.6' W
39° 11.1' N 80° 21.6' W

Map Reference Mt. Clare 7 1/2'

R.M.I.

Receiving Stream Unnamed Trib. To Lost Creek

Company Name or Owner A. R. Crumrine - Central #7 (Operator)

J. D. Stout (Landowner)

Coal Designation Pittsburgh

Elev. 1200' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 40-017-1 & 40-017-2

Surface, Ground, or Impoundment Ground

Method of Measurement ~~Method of Flow~~ Pipe and Bucket

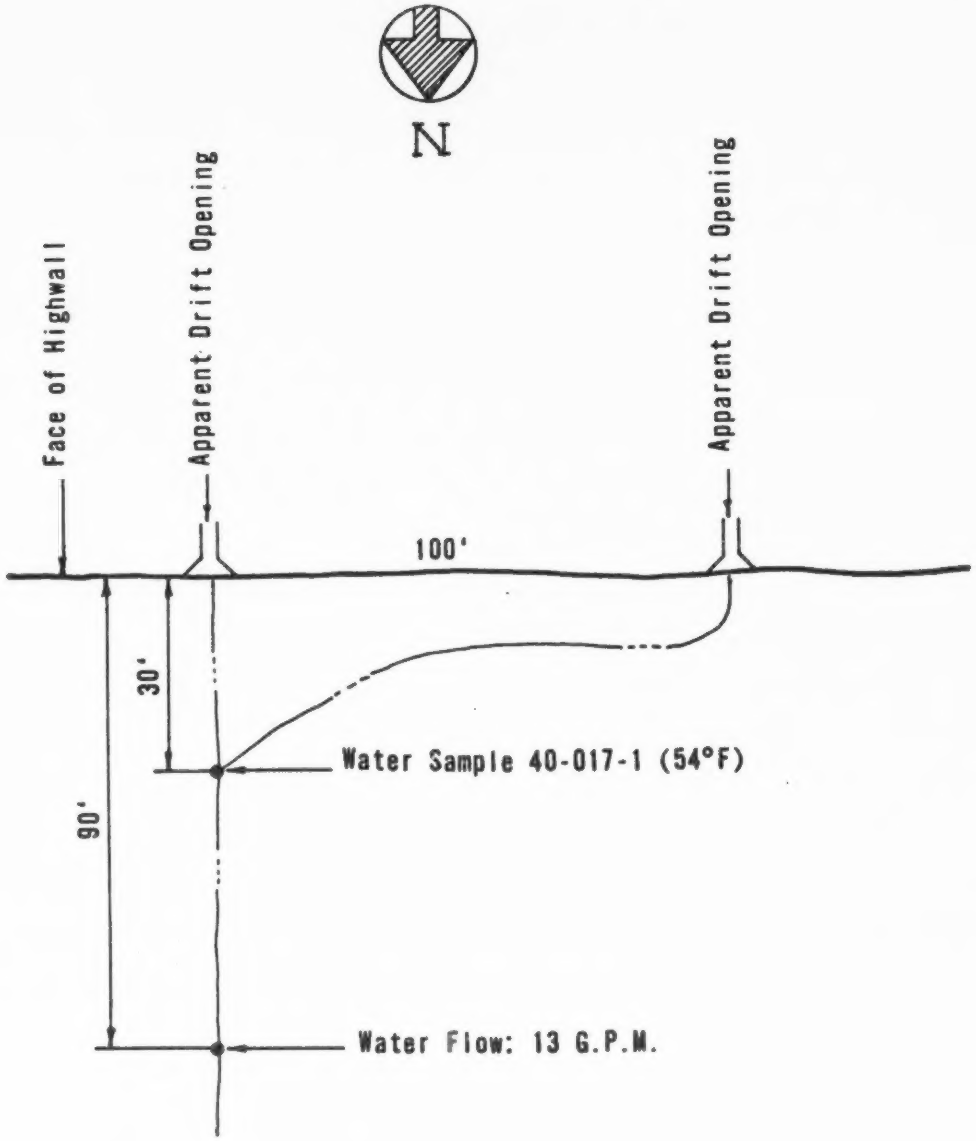
Measurement of Flow 13 gpm

pH Water Temp. 54° Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: The mine openings are closed but are draining. Water sample 40-017-2 was taken on a county road 0.4 miles East of Route 27. This sample includes flows from 40-016 and 40-017 as well as drainage from strip mines on the North side of the valley. This stream is unnamed tributary to Lost Creek. The access is good. No subsidence is in the area.


N
Face of Highwall
Apparent Drift Opening
Apparent Drift Opening
100'
30'
90'
Water Sample 40-017-1 (54°F)
Water Flow: 13 G.P.M.

SKETCH - MINE NO. 40-017

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 40-058

Date January 11, 1967

Sampler R. Choy

Time 10:00 A. M.

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 11.8' N 80° 19.9' W
39° 11.9' N 80° 19.8' W

Map Reference Mt. Clare 7 1/2'

R.M.I.

Receiving Stream Unnamed Trib. To Brown's Creek

Company Name or Owner Bob Mandez

Coal Designation Pittsburgh

Elev. 1380' Area Mined

Reserves

Mining Method Drift Mine (abd)

Sample Number 40-058-1

Surface, Ground, or Impoundment Ground

Estimate of Flow

Measurement of Flow

pH Temp. Spec. Cond.

Notes: No further investigation needed

No visible mine openings were found yet water seepage is in evidence (water sample taken), possibly from sealed mine. Accessibility is good - 3/4 mile.

Section

SEE
GEOLOGIC
SECTION

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY MINE No. 40-058

Date March 2, 1967 Sampler Fleischman and Choy

Time 10:30 A.M. Air Temp. 53° F Location

State W. Va. County Harrison TWP Grant

Section Coord. 39° 11.8' N 80° 19.9' W

Map Reference Mt. Clare 7 1/2' R.M.I.

Receiving Stream Unnamed Trib. to Brown's Creek

Company Name or Owner Bob Mandez (Owner)

Coal Designation Pittsburgh

Elev. 1380' Area Mined

Reserves

Mining Method Drift and Strip (abd)

Sample Number 40-058-3 and 058-4

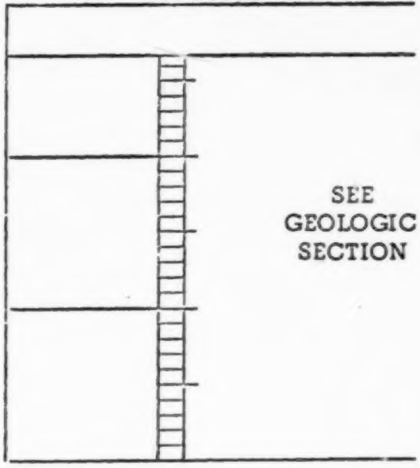
Surface, Ground, or Impoundment Ground

Estimate of Flow 20 gpm -- Measured

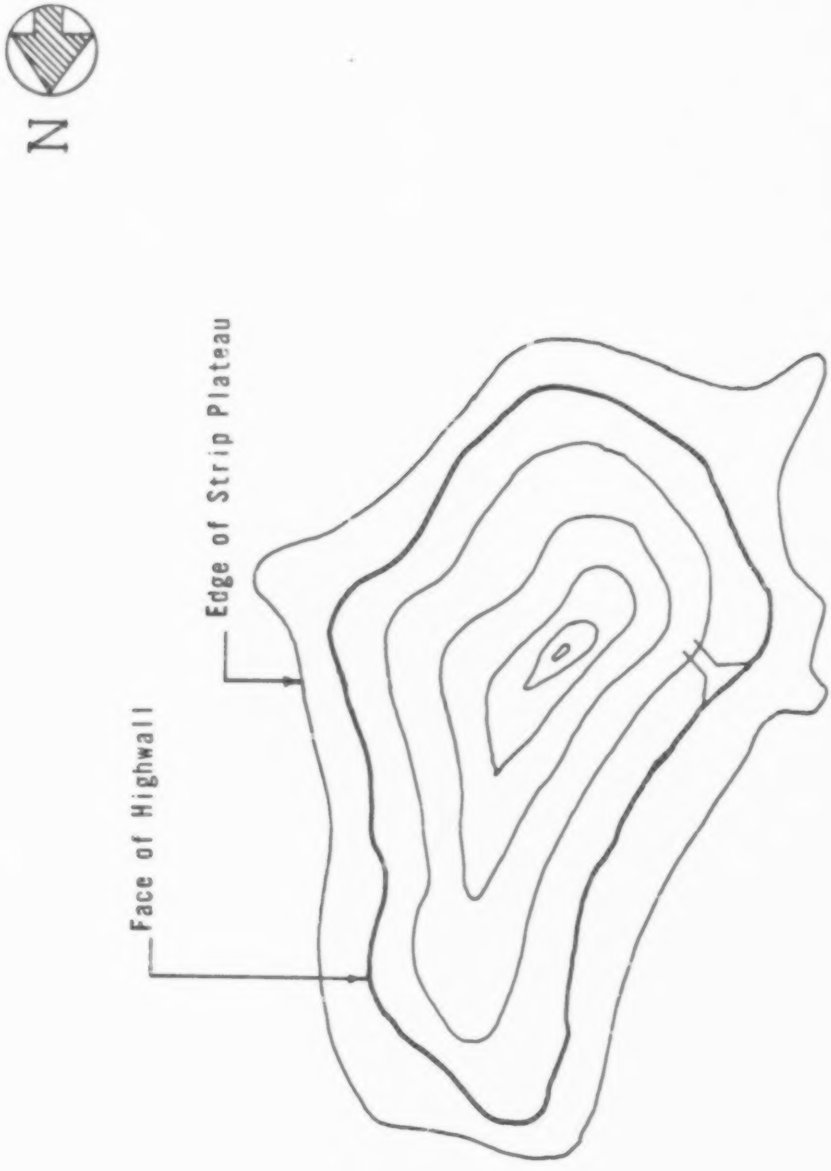
Method of Measurement ~~Measurement of Flow~~ Pipe and Bucket

pH Temp. Spec. Cond.

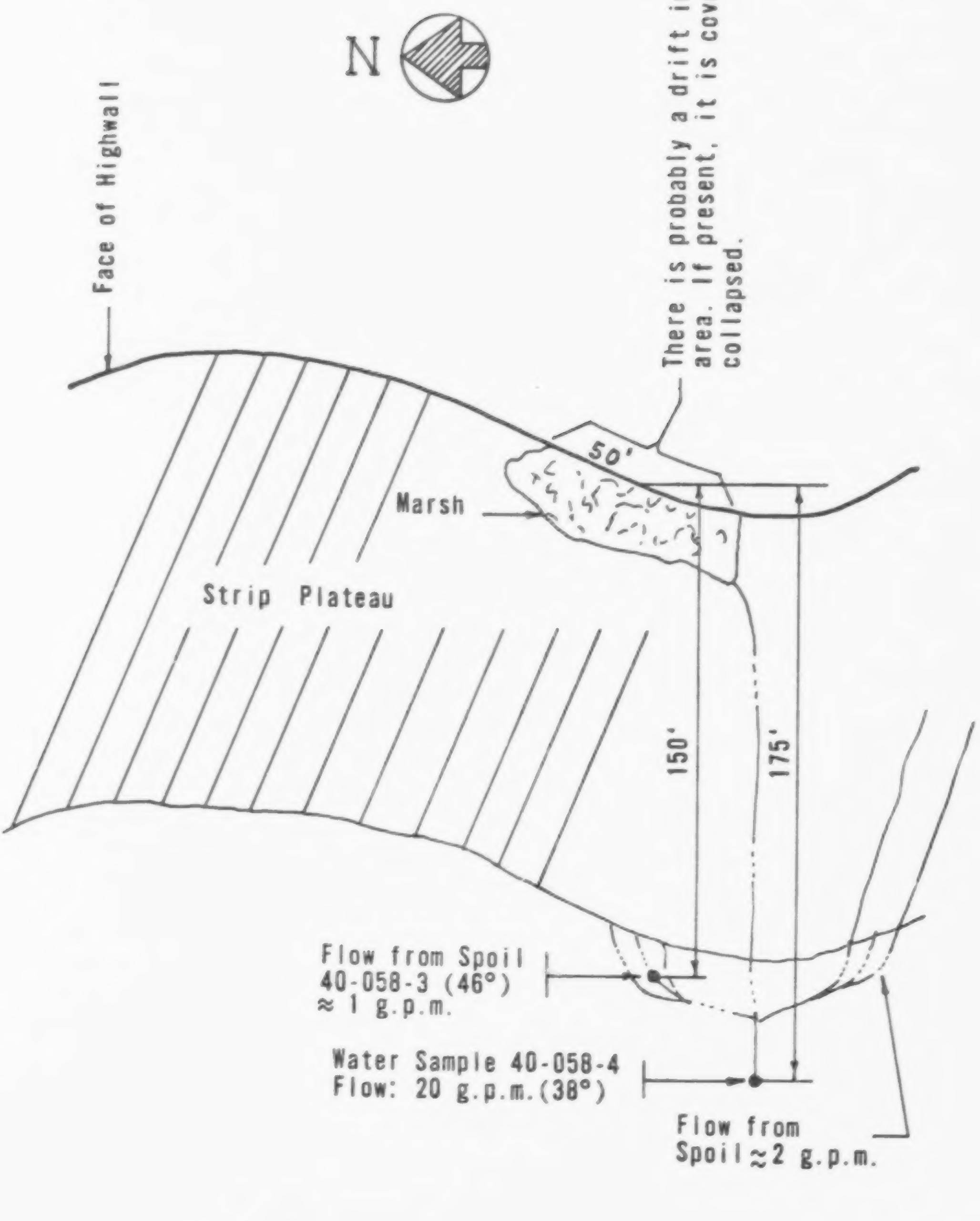
Section



Notes: No drift opening was located in this area: however, a flow was located in the area which showed a mine on the Quad. sheet. There is an exposed highwall which reveals many vertical joints in the Cedarville Sandstone. The joints are probably the main source of water to the mine below. The access is very good. This would be a good mine site to be considered for further study. High highwall completely encircles island. No subsidence was noted.


N
Edge of Strip Plateau
Face of Highwall

SKETCH - MINE NO. 40-058


N
Face of Highwall
There is probably a drift in this area. If present, it is covered or collapsed.
50'
Marsh
Strip Plateau
150'
175'
Flow from Spoil 40-058-3 (46°) ≈ 1 g.p.m.
Water Sample 40-058-4 Flow: 20 g.p.m.(38°)
Flow from Spoil ≈ 2 g.p.m.

SKETCH - MINE NO. 40-058

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 58-007

Date January 14, 1967

Sampler Siems and Fleischman

Time

Location

State W. Va.

County Lewis

TWP Freeman's Creek

Section

Coord. 80° 31'30" W 39° 02'10"N
80° 31.2' W 39° 02.2' N

Map Reference Vadis 15'

R.M.I.

Receiving Stream Murphy Creek

Company Name or Owner J. A. Fischer- Surface Owner ; Paul Gabbert (Beck Fuel & Supply Co.)- Coal Owner ; Rick Coal Co. Clinksburg Mine

Coal Designation Pittsburgh

Elev. 1240' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 58-007-0 Gob
58-007-1 Water

Surface, Ground, or Impoundment Ground

Estimate of Flow < .5

Measurement of Flow

pH Temp. Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: Four openings, one open, one caved in, two wet. Small gob piles with white coating on some of the particles. The area has four reported mine openings only one of which is now open. The open mine is seeping slightly.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 58-007

RESURVEY

Date March 1, 1967

Sampler Choy and Fleischman

Time 11:15 A.M. Air Temp. 42° F.

Location

County Lewis

TWP Freeman's Creek

State W. Va.

Coord. 80° 31.5' W 39° 02-2' N

Section

Map Reference Vadis 15'

R.M.I.

Receiving Stream Murphy Creek

Company Name or Owner Paul Gabbert (Beck Fuel and Supply)

Coal Designation Pittsburgh

Elev. 1240' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 58-007-2

Surface, Ground, or Impoundment Surface and Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

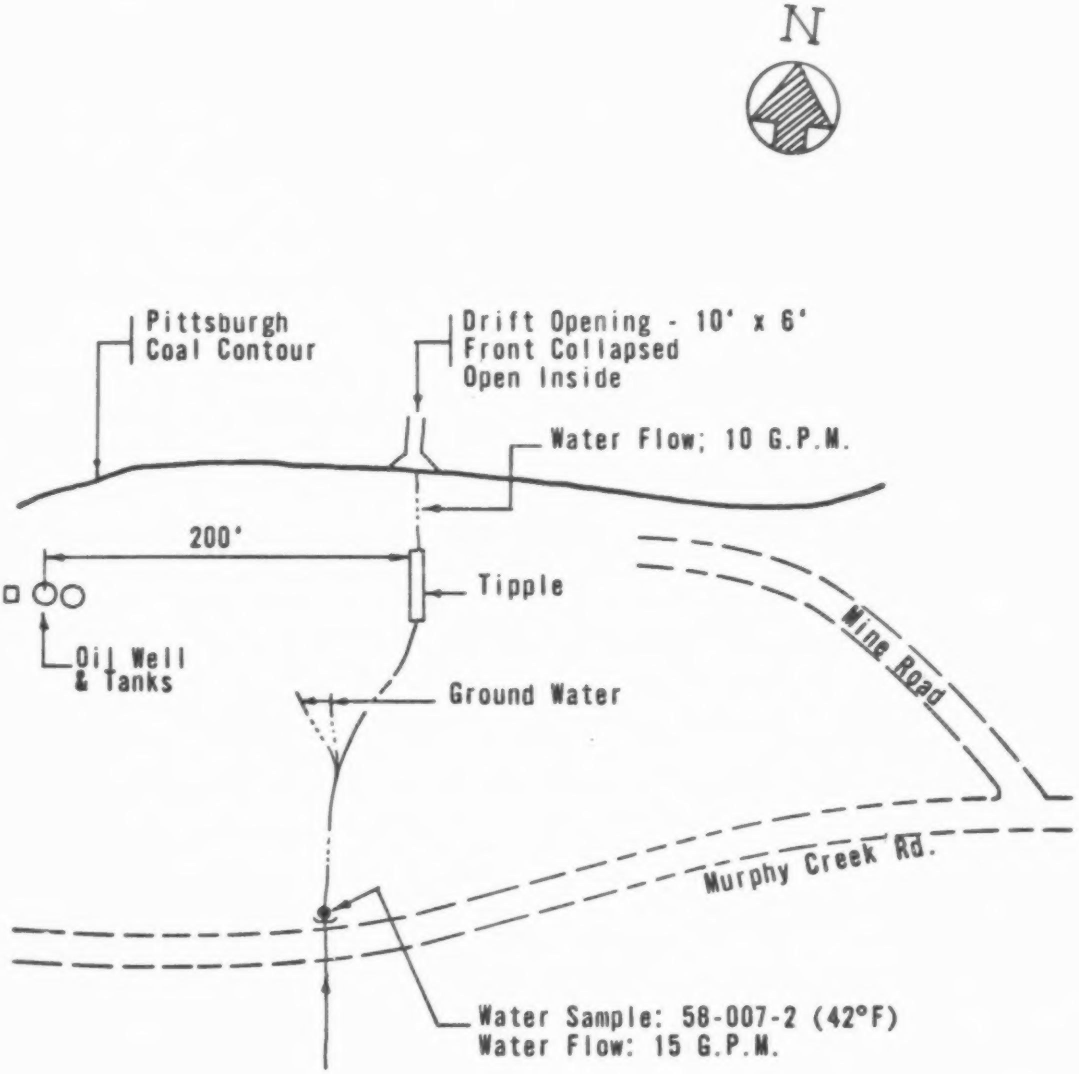
Measurement of Flow 5 gpm Surface; 10 gpm Ground

pH Temp. Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: This mine is reported to have four (4) openings only one of which was in evidence. Investigation on January 14, 1967 indicated only a seep at the opening. Investigation this date indicated 10 gpm. Access is good.


N
Pittsburgh Coal Contour
Drift Opening - 10' x 6' Front Collapsed Open Inside
Water Flow; 10 G.P.M.
200'
Tipple
Oil Well & Tanks
Ground Water
Mine Road
Murphy Creek Rd.
Water Sample: 58-007-2 (42°F)
Water Flow: 15 G.P.M.

SKETCH - MINE NO. 58-007

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 58-010

Date January 25, 1967

Sampler H. Sterner & L. M. Hsia

Time 3:45

Location

State W. Va.

County Lewis

TWP Freeman's Creek

Section

Coord. 39° 02.2' N 80° 31.5' W

Map Reference Vadis 15'

R.M.I.

Receiving Stream Tributary to Murphy Creek

Company Name or Owner A. C. Fischer (Surface)

Coal Designation Pittsburgh

Elev. 1240' Area Mined

Reserves

Mining Method Drift

Sample Number 58-010-1 58-010-2 Water samples see below

Surface, Ground, or Impoundment Spring

Estimate of Flow

Measurement of Flow 0.75 gpm

pH Temp. Spec. Cond.

Notes: Six openings investigated.

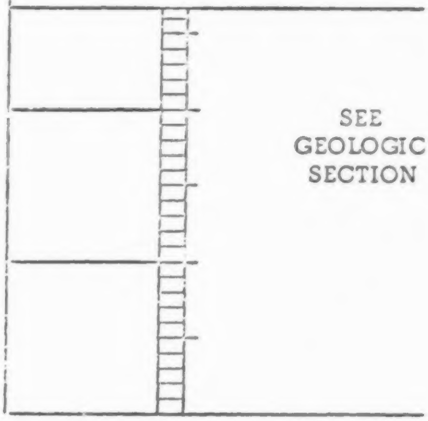
Five openings caved in or filled - one opening measured 6' x 4'.

Water impounded behind opening.

Sample 58-010-1 taken from inside mine opening.

Sample 58-010-2 taken from outside mine opening.

Section



SEE GEOLOGIC SECTION

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 58-010

RESURVEY

Date March 1, 1967

Sampler Fleischman and Choy

Time 11:30 A.M. Air Temp. 40°

Location

State W. Va.

County Lewis

TWP Freeman's Creek

Section

Coord. 80° 31' 56" W 39° 02' 25" N

Map Reference Vadis 15'

R.M.I.

Receiving Stream Tributary to Murphy Creek

Company Name or Owner I. A. Fischer - Surface Owner

Paul Gabbert (Beck Fuel & Supply Co.) - Coal Owner

Coal Designation Pittsburgh

Elev. 1240 Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 58-010-1&2

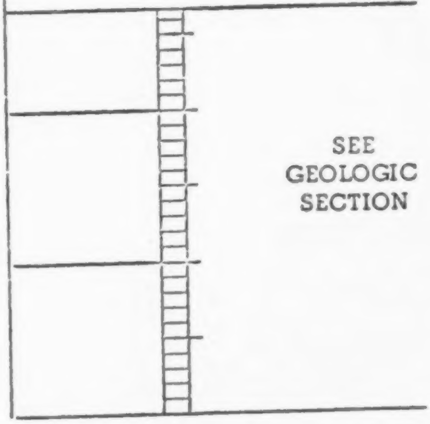
Surface, Ground, or Impoundment Ground and Surface

Method of Measurement Pipe and Bucket

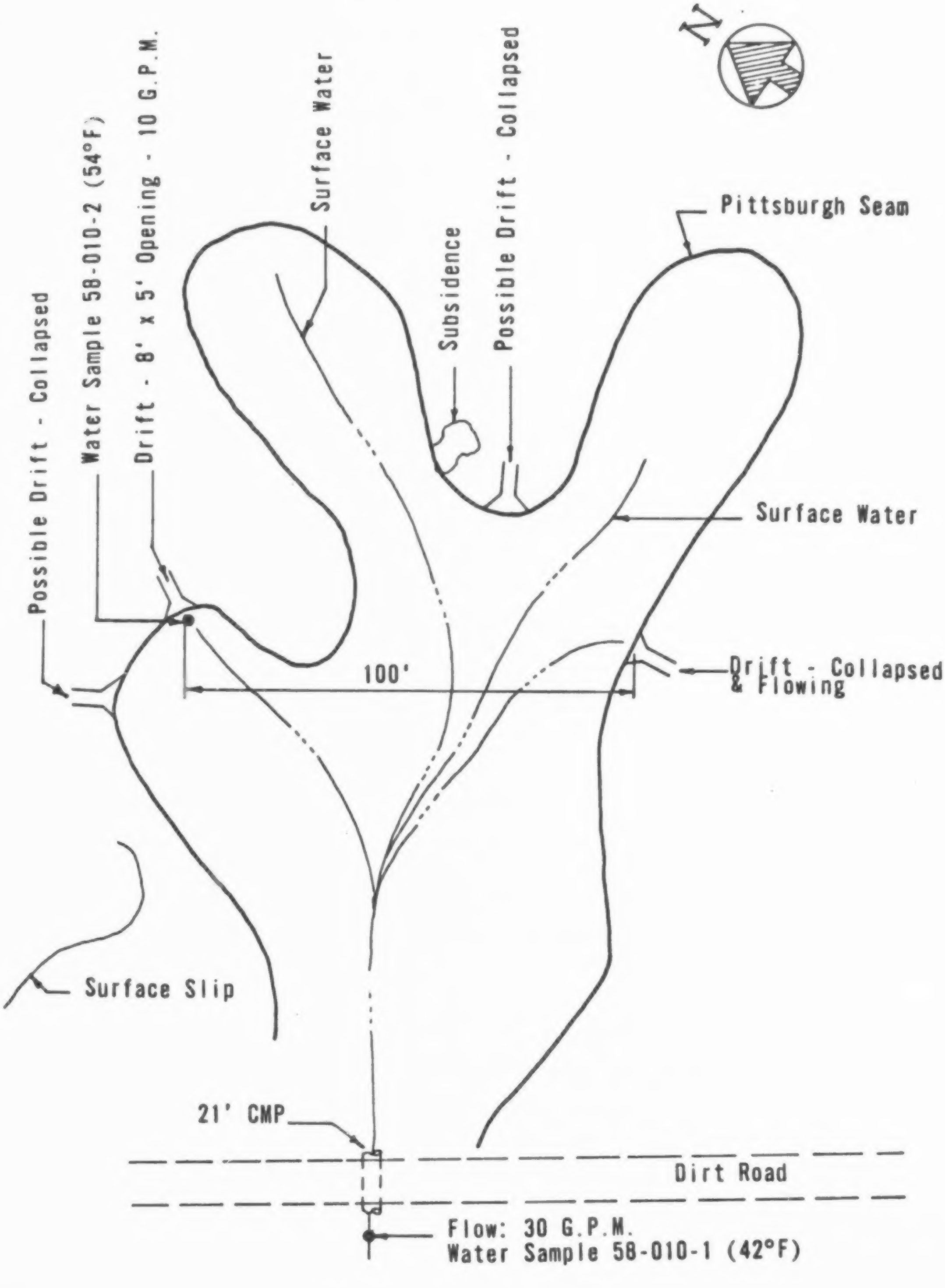
Measurement of Flow 10 gpm

pH Temp. Spec. Cond.

Section



Notes: Located were two definite openings, both flowing. Also, two possible openings were located. There is local subsidence, and a fissure due to surface slippage.


N
Possible Drift - Collapsed
Water Sample 58-010-2 (54°F)
Drift - 8' x 5' Opening - 10 G.P.M.
Surface Water
Subsidence
Possible Drift - Collapsed
Pittsburgh Seam
Surface Water
100'
Drift - Collapsed & Flowing
Surface Slip
21' CMP
Dirt Road
Flow: 30 G.P.M.
Water Sample 58-010-1 (42°F)

SKETCH - MINE NO. 58-010

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 58-012

Date January 14, 1967

Sampler Siems & Fleischman

Time

Location

State W. Va.

County Lewis

TWP Freeman's Creek

Section

Coord. 39°02'25"N 80°31'56"W
39°02.1 "N 80°31.5' W

Map Reference Vadis 15'

R.M.I.

Receiving Stream Tributary to Murphy Creek

Company Name or Owner A. C. Fisher

Coal Designation

Elev. 1240'

Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 58-012-1 Water
58-012-1 Gob

Surface, Ground, or Impoundment Ground

Estimate of Flow > 0.5 gpm

Measurement of Flow

pH

Temp.

Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: There were two openings in the mine, but both are now closed. One is wet, the other dry.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 58-012

RESURVEY

Date March 1, 1967

Sampler Fleischman & Choy

Time 11:45 A.M. Air Temp. 40°

Location

State W. Va.

County Lewis

TWP Freeman's Creek

Section

Coord. 80° 31'56" W 39° 02' 23" N

Map Reference Vadis 15'

R.M.I.

Receiving Stream Tributary to Murphy Creek

Company Name or Owner J. A. Fischer - Surface Owner

Coal Designation Pittsburgh

Elev. 1240' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 58-012-2

Surface, Ground, or Impoundment Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

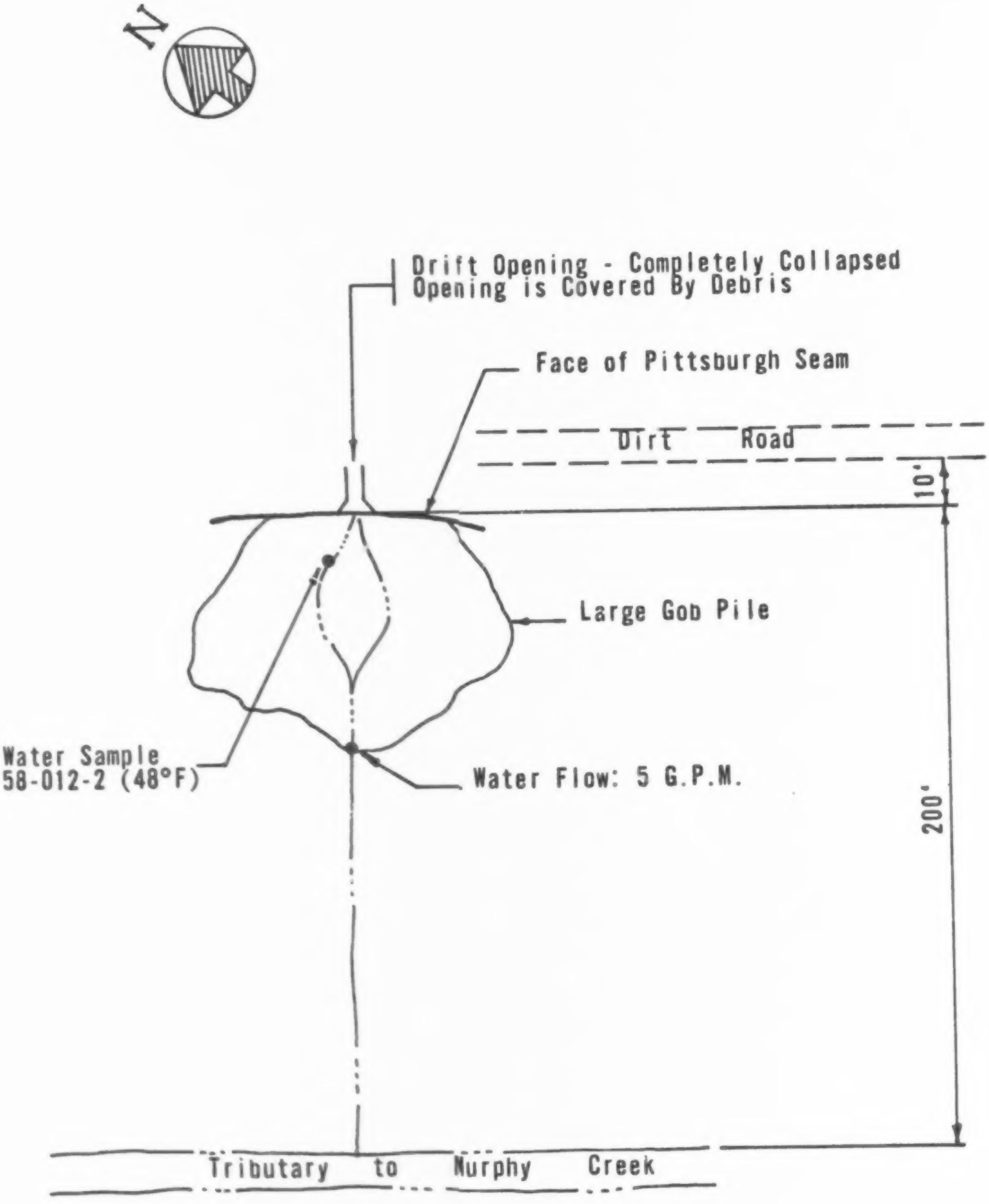
Measurement of Flow 5.0 gpm

pH Water Temp. 48° Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: The opening, which is flowing, is completely collapsed at the entrance. The entrance is covered by small brush. There is a large gob pile near the mine. A geologic section will be submitted if a resurvey is required.


N
Drift Opening - Completely Collapsed
Opening is Covered By Debris
Face of Pittsburgh Seam
Dirt Road
10'
Large Gob Pile
Water Sample
58-012-2 (48°F)
Water Flow: 5 G.P.M.
200'
Tributary to Murphy Creek

SKETCH - MINE NO. 58-012

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 58-017

Date January 14, 1967

Sampler Siems and Fleischman

Time 9:30 A.M.

Location

State W. Va.

County Lewis

TWP Freeman's Creek

Section

Coord. 80° 30' 21"W   39° 07'33"N
80° 30.2'W   39° 07.5' N

Map Reference Vadis 15'

R.M.I.

Receiving Stream Millstone Run

Company Name or Owner Gauley Company (B&O Railroad) - Coal Owner
Earl & John Garrett - Surface Owner

Coal Designation Pittsburgh

Elev. 1240'   Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 58-017-0 Spring water sample
58-017-1 Drift water sample

Surface, Ground, or Impoundment Ground & Spring-2

Estimate of Flow

Measurement of Flow Drift - 8 gpm
Spring - 2 gpm

pH   Temp.   Spec. Cond.

Notes: Old drift opening has been obliterated by later stripping. Access is good.

Section

SEE GEOLOGIC SECTION

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 58-017

Date January 31, 1967

Sampler Eichner, Choy, Siems, Fleischman, Hsia

Time 5:15 P.M. Air Temp. 49° F

Location

State W. Va.

County Lewis

TWP Freeman's Creek

Section

Coord. 39° 07' 23"N 80° 30' 21"W
39° 07.5'N 80° 30.2"W

Map Reference Vadis 15'

R.M.I.

Receiving Stream Millstone Run

Company Name or Owner Gauley Company (B&O Railroad) - Coal Owner
Earl and John Garrett - Surface Owner

Coal Designation Pittsburgh

Elev. 1240' Area Mined

Reserves

Mining Method Drift then Strip (abd)

Sample Number 58-017-4

Surface, Ground, or Impoundment Surface & Ground

Method of Measurement ~~Estimate of Flow~~ Pipe & Bucket

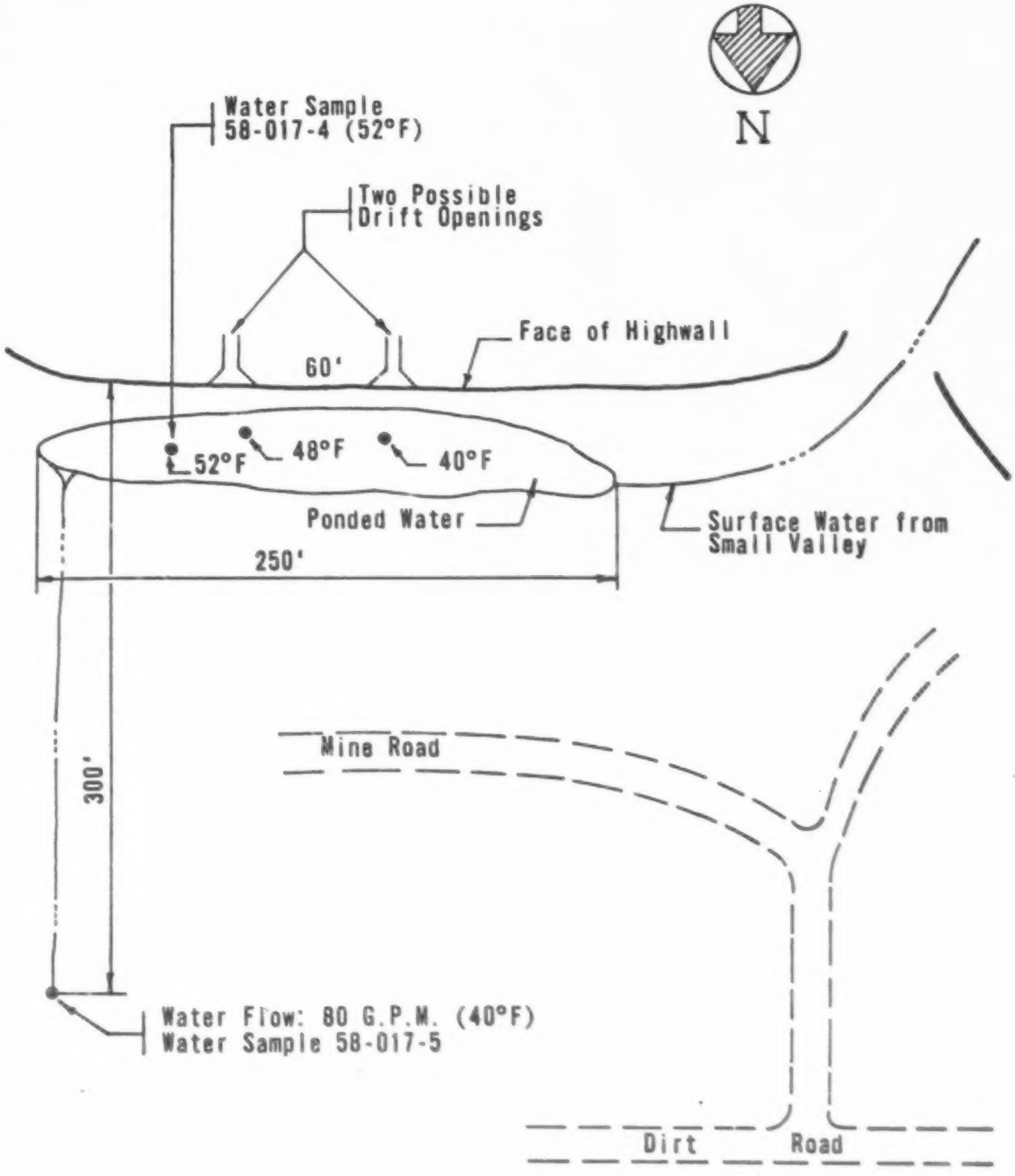
Measurement of Flow 80 gpm 90% Surface 10% Mine

pH Temp. Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: The old drift opening has been obliterated by later stripping. Water is seeping out of the highwall in several places. There is no apparent drainage directly from a drift mine. The highwall is inaccessible and is falling. Access is good.


N
Water Sample
58-017-4 (52°F)
Two Possible
Drift Openings
Face of Highwall
60'
52°F
48°F
40°F
Ponded Water
Surface Water from
Small Valley
250'
300'
Mine Road
Water Flow: 80 G.P.M. (40°F)
Water Sample 58-017-5
Dirt Road

SKETCH - MINE NO. 58-017

MONONGAHELA RIVER MINE DRAINAGE
REMEDIAL PROJECT
MINE INVENTORY CHECK LIST

MINE No. 62-002

Date January 13, 1967

Sampler R. Choy & L.M. Hsia

Time

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 08.7'N 80° 22.7'W
39° 08.6'N 80° 22.9'W

Map Reference West Milford 7 1/2'

R.M.I.

Receiving Stream Unnamed Trib. To Duck Creek

Company Name or Owner Steve Tefer

Coal Designation Redstone

Elev. 1390' Area Mined

Reserves

Mining Method Drift and Auger

Sample Number 62-002-1

Surface, Ground, or Impoundment Ground

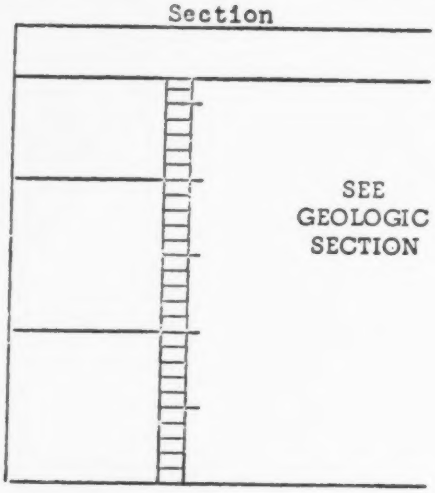
Estimate of Flow

Measurement of Flow 3 gpm

pH Temp. Spec. Cond.

Notes: These mine openings are exposed by stripping. Some auger holes into the Redstone Seams are in evidence. Water sample taken at the partially covered entrance to the mine.

Section



SEE GEOLOGIC SECTION

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 62-002

Date January 25, 1967

Sampler Eichner, Choy, Siems, Fleischman

Time 4:30 Air Temp. 62°F

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 08.7'N 80° 22.7'W

Map Reference West Milford 7 1/2'

R.M.I.

Receiving Stream Unnamed Trib. To Duck Creek

Company Name or Owner Steve Tefer Mine

Coal Designation Redstone

Elev. 1390'

Area Mined

Reserves

Mining Method Drift and Auger

Sample Number 62-002-2

Surface, Ground, or Impoundment Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

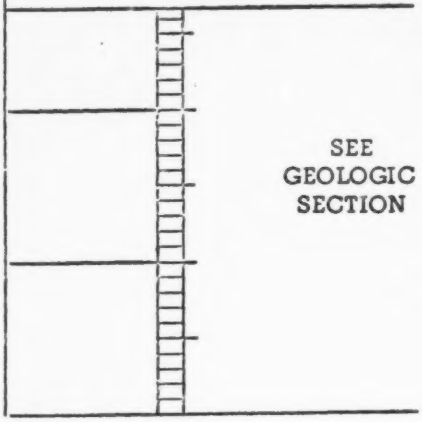
Measurement of Flow 6.5 gpm

pH

Water Temp. 53°

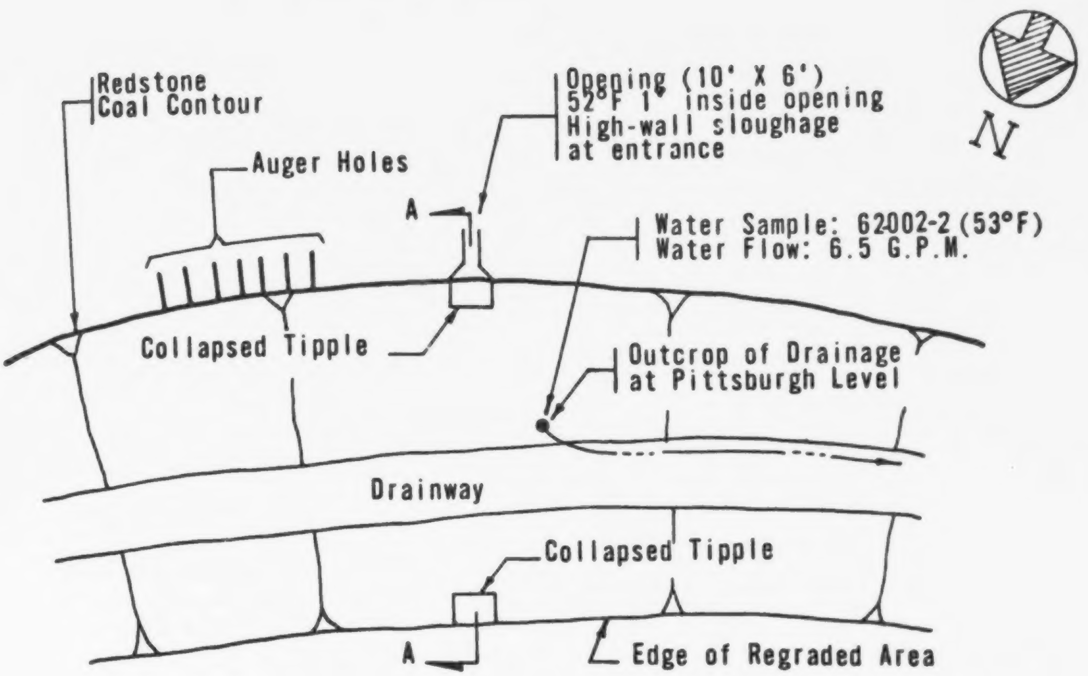
Spec. Cond.

Section

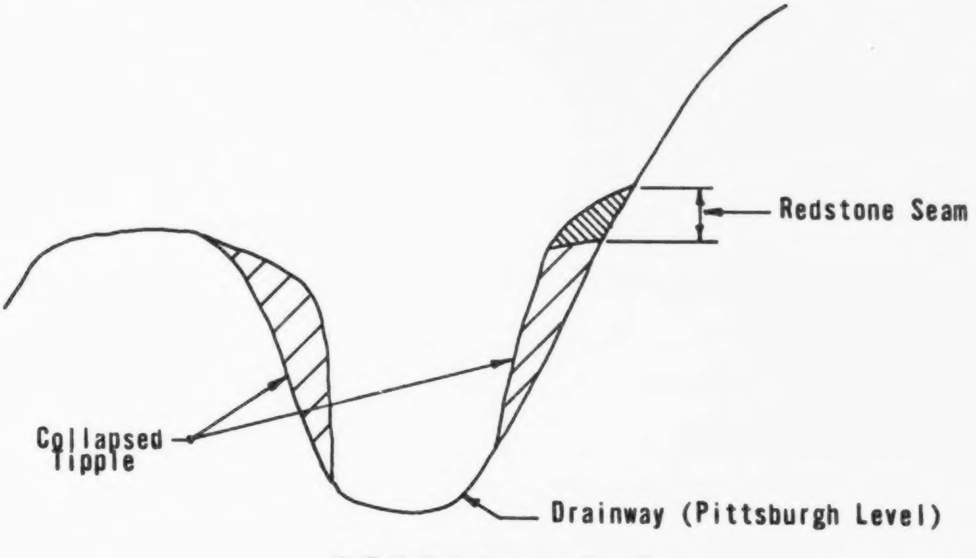


SEE GEOLOGIC SECTION

Notes: There is an east and a west opening for this mine. The east opening is dry. At the west opening the Redstone seam was drift mined. The collapsed tipple indicated that trucks were loaded by driving 30' ± below the level of Redstone seam at the elevation of the stripped Pittsburgh seam. Drainage originated at the Pittsburgh seam although the seam is not in evidence. Sloughage of overburden has almost completely closed the entrance. 48" ø auger holes are in evidence 70' N of opening and are approximately 25' deep. Area over mine was not traversed because of inaccessibility of highwall. Area is accessible.


Redstone
Coal Contour
Auger Holes
Opening (10' X 6')
52°F 1' inside opening
High-wall sloughage
at entrance
N
A
Water Sample: 62002-2 (53°F)
Water Flow: 6.5 G.P.M.
Collapsed Tipple
Outcrop of Drainage
at Pittsburgh Level
Drainway
Collapsed Tipple
A
Edge of Regraded Area

PLAN
WEST OPENING


Redstone Seam
Collapsed
Tipple
Drainway (Pittsburgh Level)

SECTION A-A

SKETCH - MINE NO. 62-002

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 62-008

Date January 13, 1967

Sampler R. Choy & L.M. Hsia

Time

Location

State W. Va

County Harrison

TWP Grant

Section

Coord. 30° 10.6'N 80° 23.2'W
30° 10.6'N 80° 23.3'W

Map Reference W. Milford 7 1/2'

R.M.I.

Receiving Stream Tributary To Lost Creek

Company Name or Owner Petitto Brothers

Coal Designation Redstone and Pittsburgh

Elev. 1380' Area Mined

Reserves

Mining Method Drift Mines

Sample Number

Surface, Ground, or Impoundment Ground

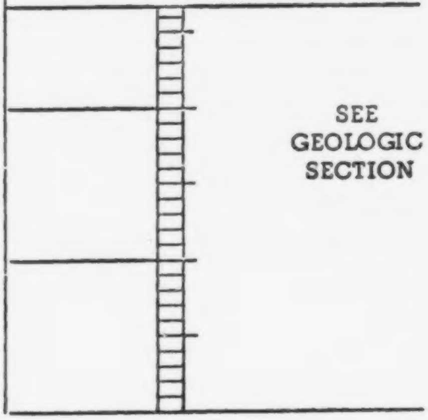
Estimate of Flow

Measurement of Flow Seepage From Highwall and Surface Runoff. 5 gpm

pH Temp. Spec. Cond.

Notes: Few auger holes through both Redstone and Pittsburgh Seams and drift mine openings are in evidence.

Section



MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 62-008

Date January 26, 1967

Sampler Eichner, Choy, Siems, Fleischman, Hsia, Sterner

Time 1:30 P.M. Air Temp. 67° F

Location

State W. Va.

County Harrison TWP Grant

Section

Coord. 39° 10.6'N 80° 23.2'W
39° 10.6'N 80° 23.3'W

Map Reference West Milford 7 1/2'

R.M.I.

Receiving Stream Unnamed Tributary of Lost Creek

Company Name or Owner Petitto Brothers

Coal Designation Redstone and Pittsburgh

Section

SEE GEOLOGIC SECTION

Elev. 1380' Area Mined

Reserves

Mining Method Drift

Sample Number 62-008-2

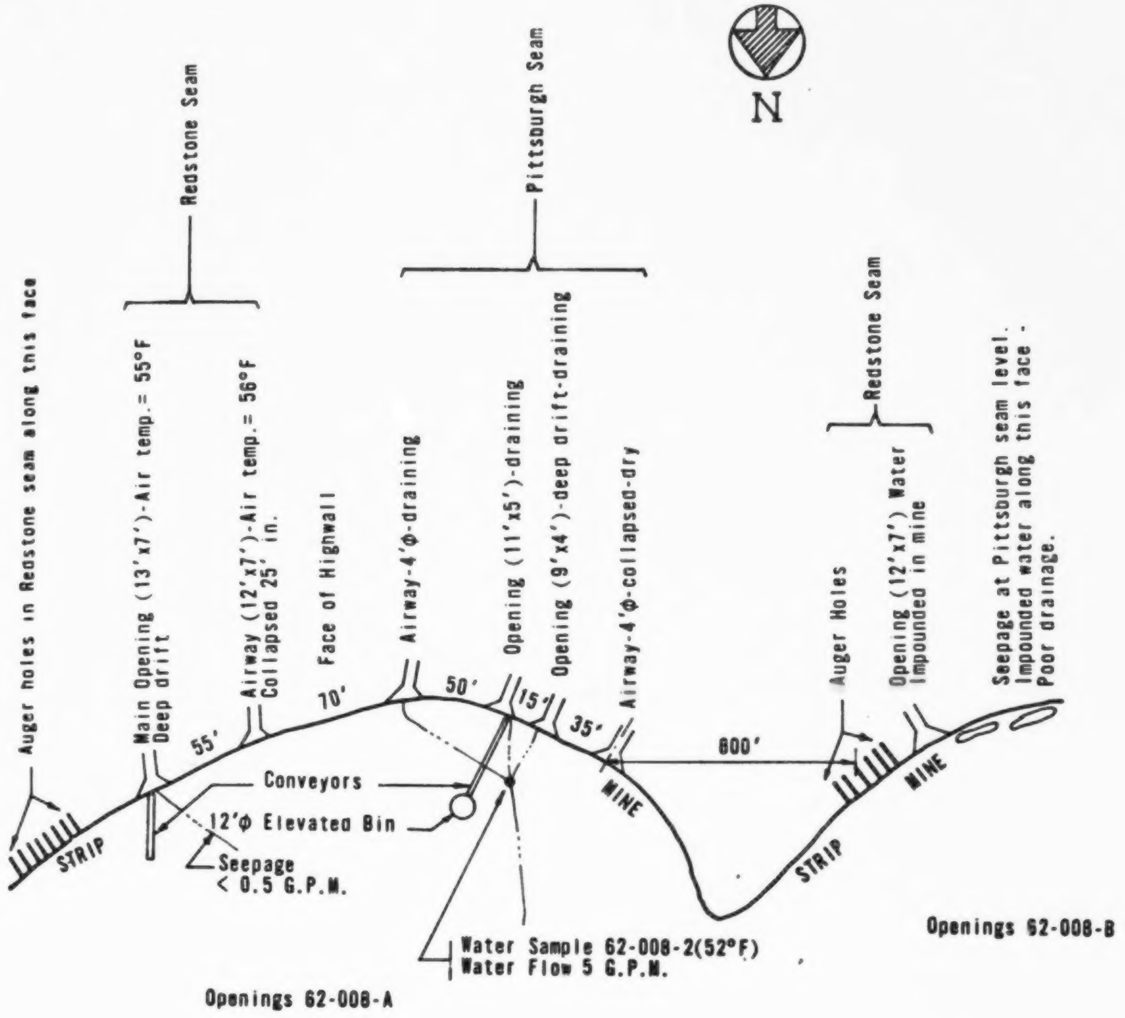
Surface, Ground, or Impoundment Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

Measurement of Flow 5 gpm

pH Temp. Spec. Cond.

Notes: This mine site is broken up into two areas, A(north face) and B(northwest face). Site A appears to have been a large operation. A water sample from the ceiling of the Redstone seam, 20' inside at Site A, is being collected. Area over mine was not traversed because of inaccessibility due to height of highwall. Subsidence not in evidence. Area is accessible.


N
Auger holes in Redstone seam along this face
Redstone Seam
Main Opening (13'x7')-Air temp.= 55°F Deep drift
Airway (12'x7')-Air temp.= 56°F Collapsed 25' in.
Face of Highwall
Pittsburgh Seam
Airway-4'Φ-draining
Opening (11'x5')-draining
Opening (9'x4')-deep drift-draining
Airway-4'Φ-collapsed-dry
Redstone Seam
Auger Holes
Opening (12'x7') Water Impounded in mine
Seepage at Pittsburgh seam level. Impounded water along this face. Poor drainage.
55'
70'
50'
15'
35'
800'
STRIP
MINE
STRIP
MINE
Conveyors
12'Φ Elevated Bin
Seepage < 0.5 G.P.M.
Water Sample 62-008-2(52°F)
Water Flow 5 G.P.M.
Openings 62-008-A
Openings 62-008-B

SKETCH - MINE NO. 62-008

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 62-013

Date January 16, 1967

Sampler R. Choy and Sterner

Time

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° 08'2N 80° 23.7W

39° 08.2'N 80° 23.1W

Map Reference West Milford 7 1/2'

R.M.I.

Receiving Stream McKinney Run

Company Name or Owner ? Mine Seal #11

Coal Designation Pittsburgh

Elev. 1370' Area Mined

Reserves

Mining Method Drift (Mine Seals) (abd)

Sample Number 62-013-1

Surface, Ground, or Impoundment Ground

Estimate of Flow

Measurement of Flow 2.5 gpm

pH Temp. Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: Several drift openings (10 found) all sealed, but now were leaking. Much of area has subsidence. Many continuing depressions, water sample taken - Mine Seal #102/5

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY MINE No. 62-013

Date January 26, 1967

Sampler Eichner, Choy, Siems, Fleischman, Sterner, Hsia.

Time 10:30 A.M. Air Temp. 65° F.

Location

State W. Va.

County Harrison

TWP Grant

Section

Coord. 39° -08.2' 80°-23.1'

Map Reference West Milford 7-1/2'

R.M.I.

Receiving Stream McKinney Run

Company Name or Owner Pennceco Coal Company

Coal Designation Redstone and Pittsburgh

Elev. 1370' Area Mined

Reserves

Mining Method Drift (also some strip to the Pittsburgh)

Sample Number

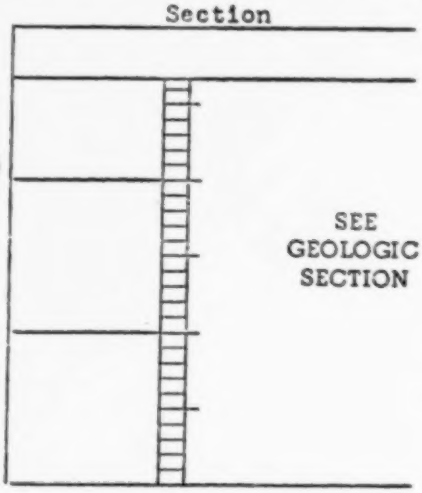
Surface, Ground, or Impoundment Ground

Estimate of Flow

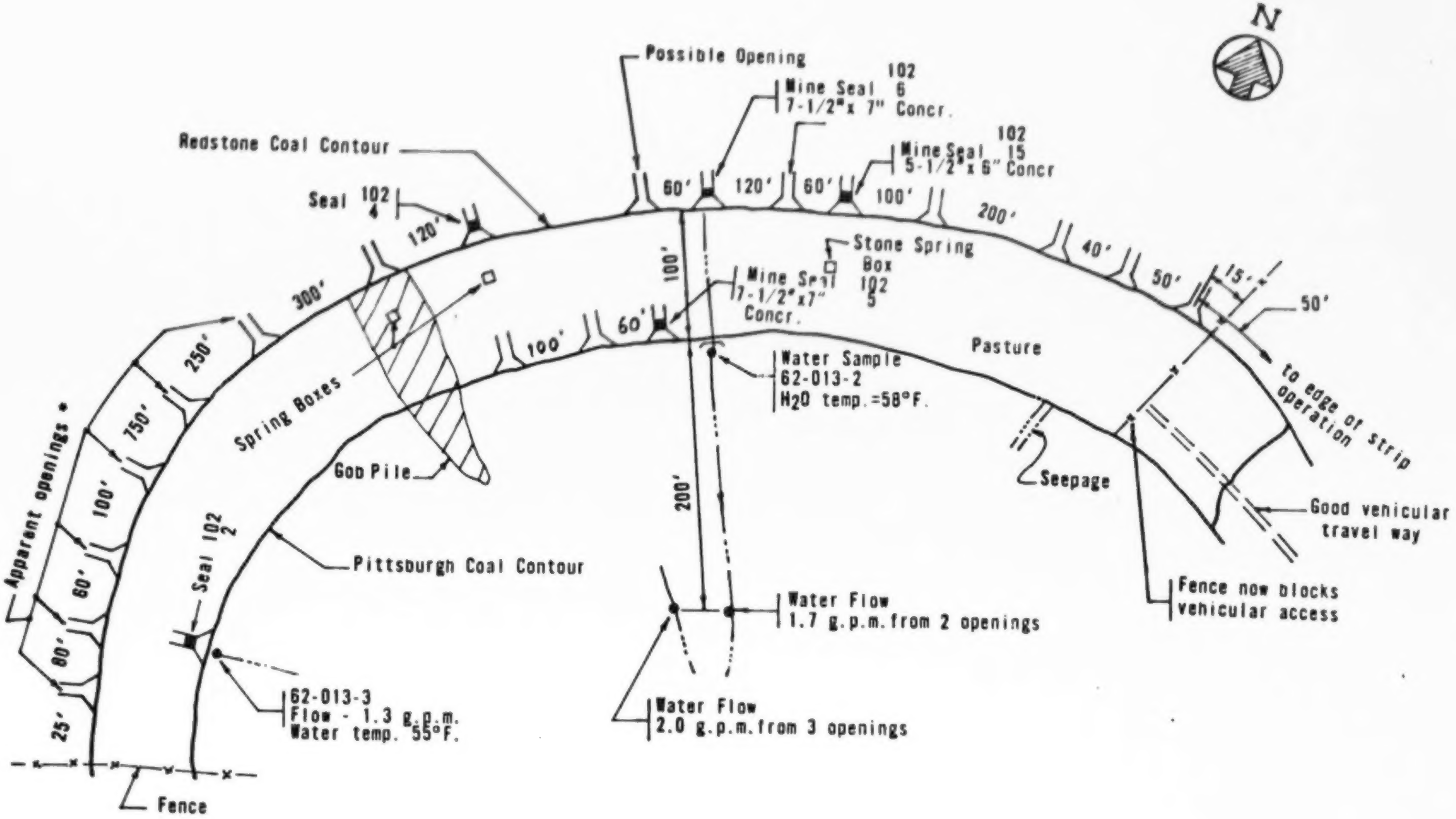
Measurement of Flow 5 gpm (Pipe and Bucket)

p^H Temp. Spec. Cond.

Section



Notes: Both the Redstone and Pittsburgh Coal seams appear to be mined. Individual mine flows noted where practical. Area also stripped to Pittsburgh seam. Extensive subsidence in evidence 10' to 15' (12' cover line) above Redstone seam. Entire area now in pasture.


N
Possible Opening
Mine Seal 102 6
7-1/2"x 7" Concr.
Mine Seal 102 15
5-1/2" x 6" Concr
Redstone Coal Contour
Seal 102 4
120'
60'
120'
60'
100'
200'
40'
50'
15'
50'
300'
250'
750'
100'
60'
80'
25'
Apparent openings *
Stone Spring Box 102 5
Mine Seal 102
7-1/2"x7"
Concr.
100'
60'
100'
Pasture
to edge of strip operation
Spring Boxes
Gob Pile
Water Sample
62-013-2
H2O temp.=58°F.
Seepage
Good vehicular travel way
200'
Seal 102 2
Pittsburgh Coal Contour
Water Flow
1.7 g.p.m. from 2 openings
Fence now blocks vehicular access
62-013-3
Flow - 1.3 g.p.m.
Water temp. 55°F.
Water Flow
2.0 g.p.m. from 3 openings
Fence

* Subsidence is so much in evidence over Redstone that actual or original openings are difficult to locate. Also subsidence areas are extremely difficult to define.

Air Temperature 65°F.

SKETCH - MINE NO. 62-013

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 62-054

Date January 16, 1967

Sampler Choy & Sterner

Time

Location

State W. Va.

County Harrison

TWP Union

Section

Coord. 39°12.9' 80°25.4'
39°13.0' 80°25.5'

Map Reference West Milford 7-1/2'

R.M.I.

Receiving Stream Unnamed Trib. to Sycamore Creek

Company Name or Owner Helmick Coal Co. Mine #1

C.R.Vance - Surface owner; Clyde Bartlett - Coal owner.

Coal Designation Pittsburgh

Elev. 1300'

Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 62-054-1

Surface, Ground, or Impoundment Ground

Estimate of Flow

Measurement of Flow 4 gpm

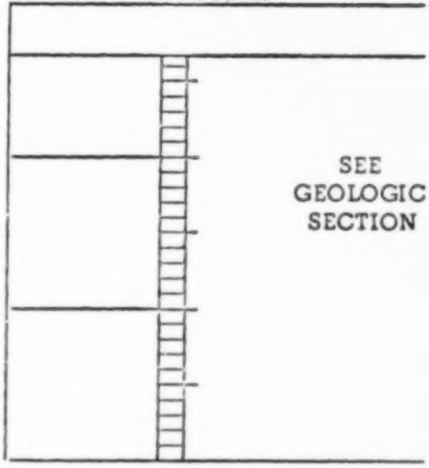
pH

Temp.

Spec. Cond.

Notes: All openings to drift mine covered but probably three. Water draining out from backfill material through channel to unnamed tributary. Gob scattered around old tipple. Some halotrichite forming - needs covering. Water sample taken.

Section



SEE GEOLOGIC SECTION

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 62-054

Date January 24, 1967

Sampler Eichner, Lawler, Choy, Sterner, Fleischman, Hsia, Siems, & Hornor.

Time 2:30 P.M.

Location

State W. Va.

County Harrison TWP Clark

Section

Coord. 39°-13.0' 80°-25.5'

Map Reference West Milford 7-1/2'

R.M.I.

Receiving Stream Unnamed tributary to Sycamore Creek

Company Name or Owner Drift mining - Helmick Coal Company Mine No. 1

C. R. Vance - Surface owner; Clyde Bartlett - Coal owner.

Coal Designation Pittsburgh

Section

Elev. 1300' Area Mined

Reserves

Mining Method Drift and Strip

Sample Number Water samples - 5 taken

Surface, Ground, or Impoundment Ground and Impoundment

Estimate of Flow

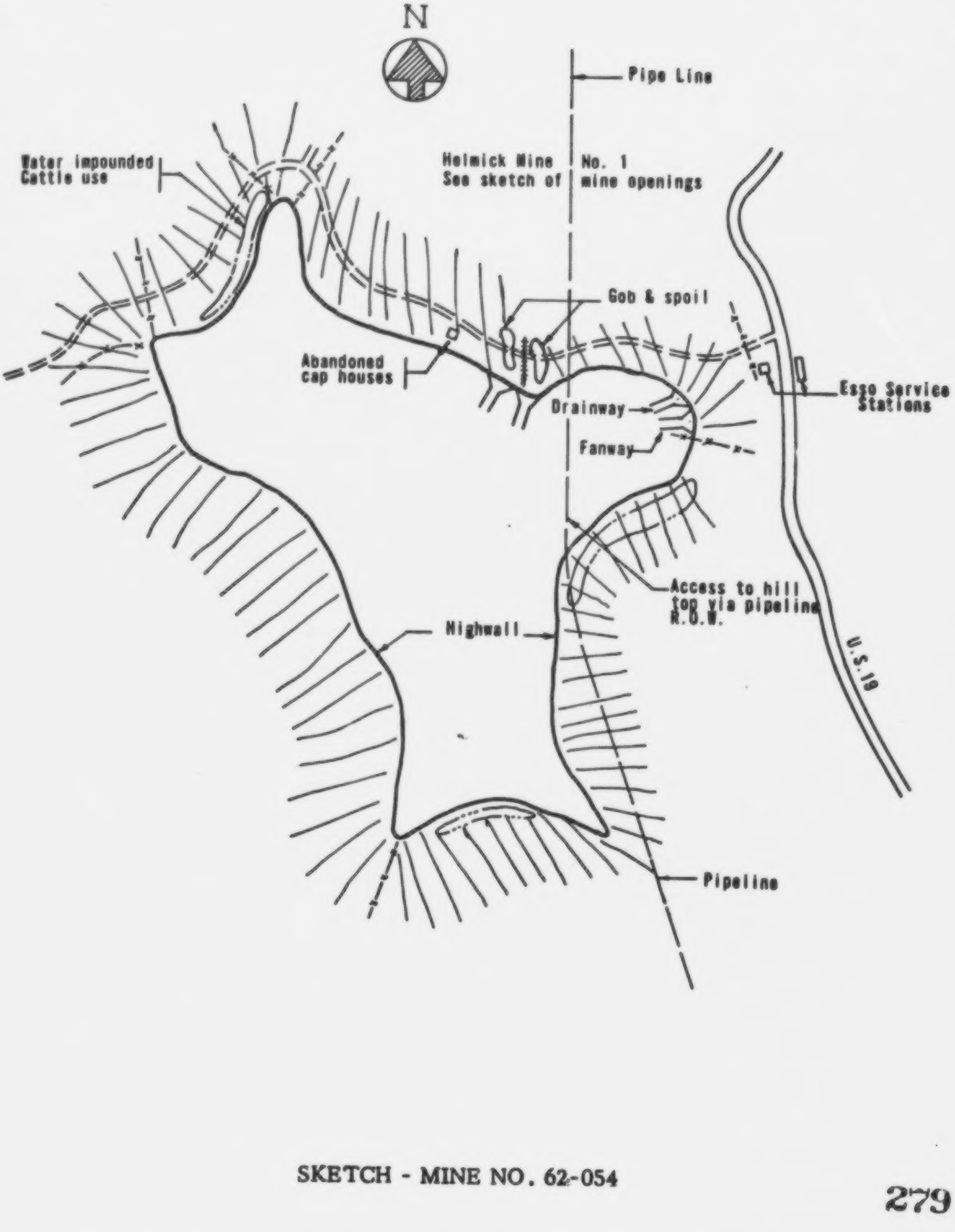
Measurement of Flow Pipe and bucket 22.4 gpm total

p^H Temp. Spec. Cond.

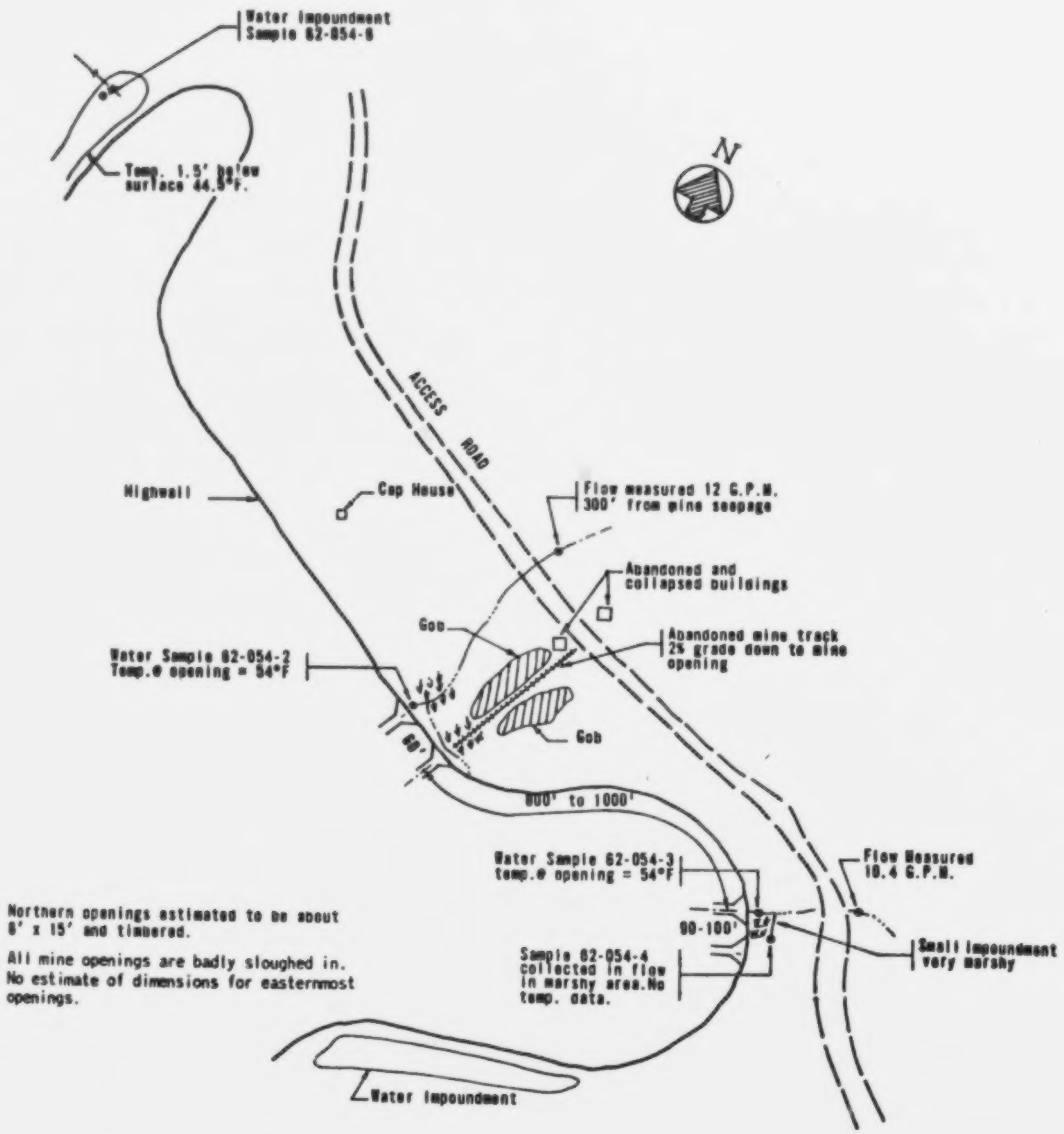
SEE GEOLOGIC SECTION

Notes: A total of five water samples taken in area. Four (4) samples were from observed drift mine flows or seepages. A fifth sample was taken from a large impoundment in the strip bench which was being used for watering cattle. Also, two water flow measurements were taken at separate drainage courses. No flows observed at other points in the strip. The whole area has been extensively stripped and the mine site is now an island. No flows observed on south or west side of strip except as noted by impoundment. Highwall exceeds 80 feet in height in a number of places. Spoil from stripping has been extensively regraded in area and seeded with the exception of the drift entrances which have been dug out to get to the Pittsburgh seam. Gob piles noted at tipple area. It appears that the drift mine operation in this area post dates the stripping operation. All openings were closed by falls and highwall slides. It is possible that they can be reopened since the drifts were apparently opened after the strip operation.

Access to this site is good with almost immediate entrance from U.S. Route 19. Mine survey maps were not available at the time of the resurvey; however, these are being researched now. No evidence of subsidence existed.


N
Pipe Line
Water impounded
Cattle use
Helmick Mine No. 1
See sketch of mine openings
Gob & spoil
Abandoned
cap houses
Esso Service
Stations
Drainway
Fanway
Access to hill
top via pipeline
R.O.W.
U.S.19
Highwall
Pipeline

SKETCH - MINE NO. 62-054


Water Impoundment
Sample 62-054-6
Temp. 1.5' below
surface 44.5°F.
N
ACCESS ROAD
Highwall
Cap House
Flow measured 12 G.P.M.
300' from mine seepage
Abandoned and
collapsed buildings
Gob
Abandoned mine track
2% grade down to mine
opening
Water Sample 62-054-2
Temp.@ opening = 54°F
60'
Gob
800' to 1000'
Water Sample 62-054-3
temp.@ opening = 54°F
Flow Measured
10.4 G.P.M.
90-100'
Sample 62-054-4
collected in flow
in marshy area. No
temp. data.
Small Impoundment
very marshy
Water Impoundment

Northern openings estimated to be about 6' x 15' and timbered.

All mine openings are badly sloughed in. No estimate of dimensions for easternmost openings.

SKETCH - MINE NO. 62-054

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

MINE No. 62-067

Date January 16, 1967

Sampler Choy & Sterner

Time

Location

State W. Va.

County Harrison

TWP Union

Section

Coord. 39° 15'2 80° 24'5
39° 15.2' 80° 24.5'

Map Reference West Milford 7-1/2'

R.M.I.

Receiving Stream Unnamed tributary to W. Fork River

Company Name or Owner Cunningham (?)

Coal Designation Pittsburgh

Elev. 1260' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 62-067-1

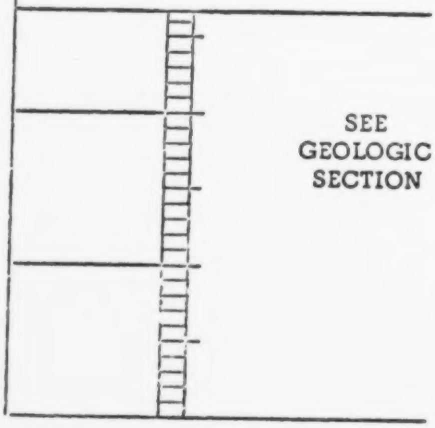
Surface, Ground, or Impoundment Ground 2

Estimate of Flow

Measurement of Flow 1.5 gpm (Pipe & bucket)

p^H Temp. Spec. Cond.

Section



Notes: Seepage from old drift mine and spoil material near strip. Gob scattered indiscriminately about the area, especially around old tipple and haul road. This mine actually in Wolf Summit Quad sheet but was surveyed as if in West Milford Quad, since it was encountered when surveying strip 62-066 which extended into the Wolf Summit Quad.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

RESURVEY

MINE No. 62-067

Date January 24, 1967

Sampler Eichner, Siems, Choy, Hsia, Sterner, Fleischman, Lawler, Hornor

Time 11 A.M.

Location

State W. Va.

County Harrison

TWP Union

Section

Coord. 39° 15.2' N 80° 24.5' W

Map Reference West Milford 7 1/2' also Wolf Summit 7 1/2'

R.M.I.

Receiving Stream Unnamed Tributary To West Fork River

Company Name or Owner Caputo Mine, Mrs. Nina A. Snider owner

Coal Designation Pittsburgh

Elev. 1260 ± Area Mined

Reserves

Mining Method Drift and Strip

Sample Number 62-067-2 62-067-3 62-067-4

Surface, Ground, or Impoundment Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

Measurement of Flow 1.6 gpm & 13.5 gpm

pH Temp. Spec. Cond.

Section

SEE GEOLOGIC SECTION

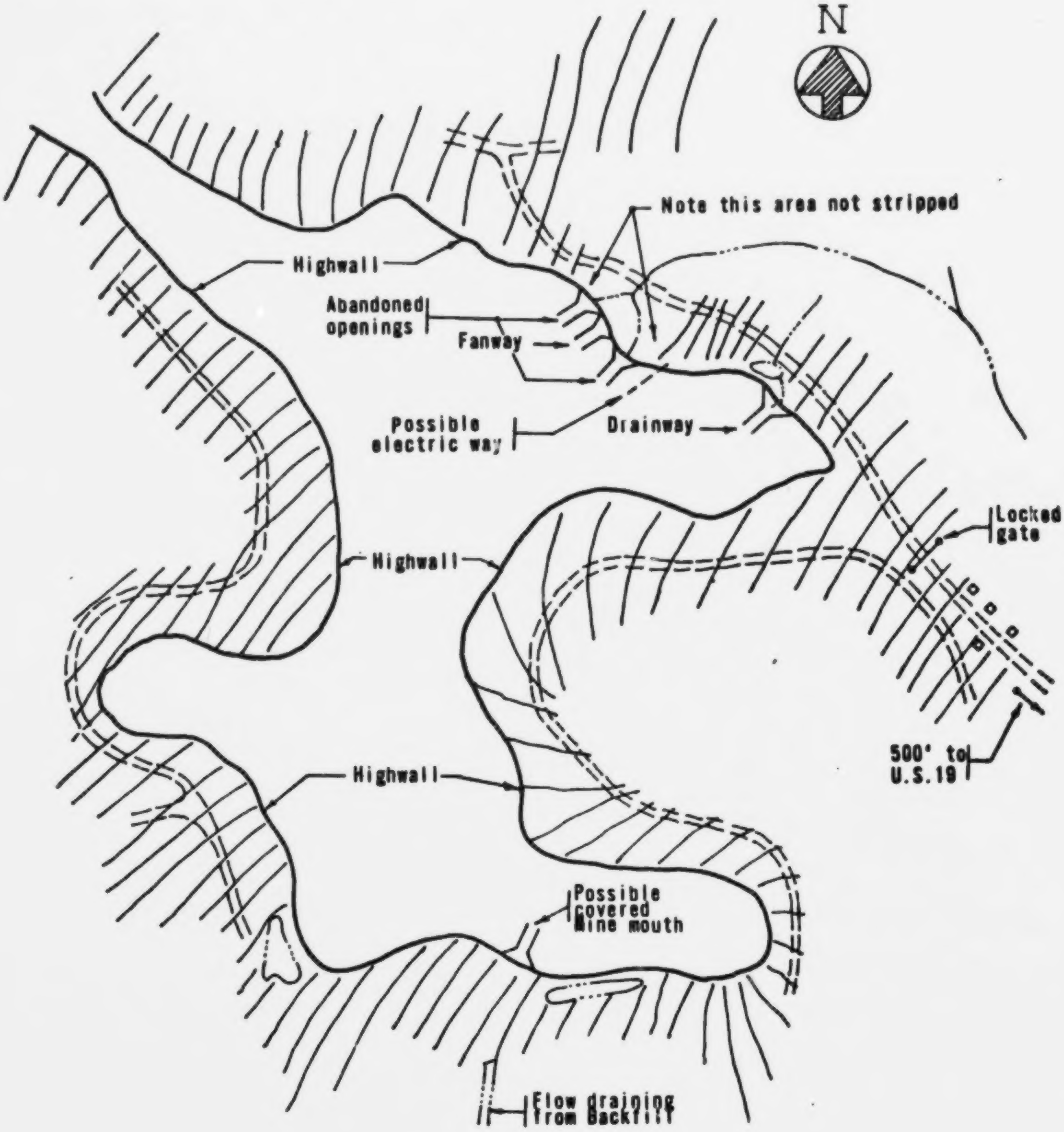
Notes: Mine drainage noted at several points - northeastern most opening not previously reported. Old drift mine which has been extensively stripped except in area of noted mine openings. Strip spoil has been regraded in part. Large amounts of scattered gob in area of openings. Access to site good over graded gravel road except in immediate area of openings. Locked gate--Key available from garage and metal shop on entrance road.

Mine No. 62-067

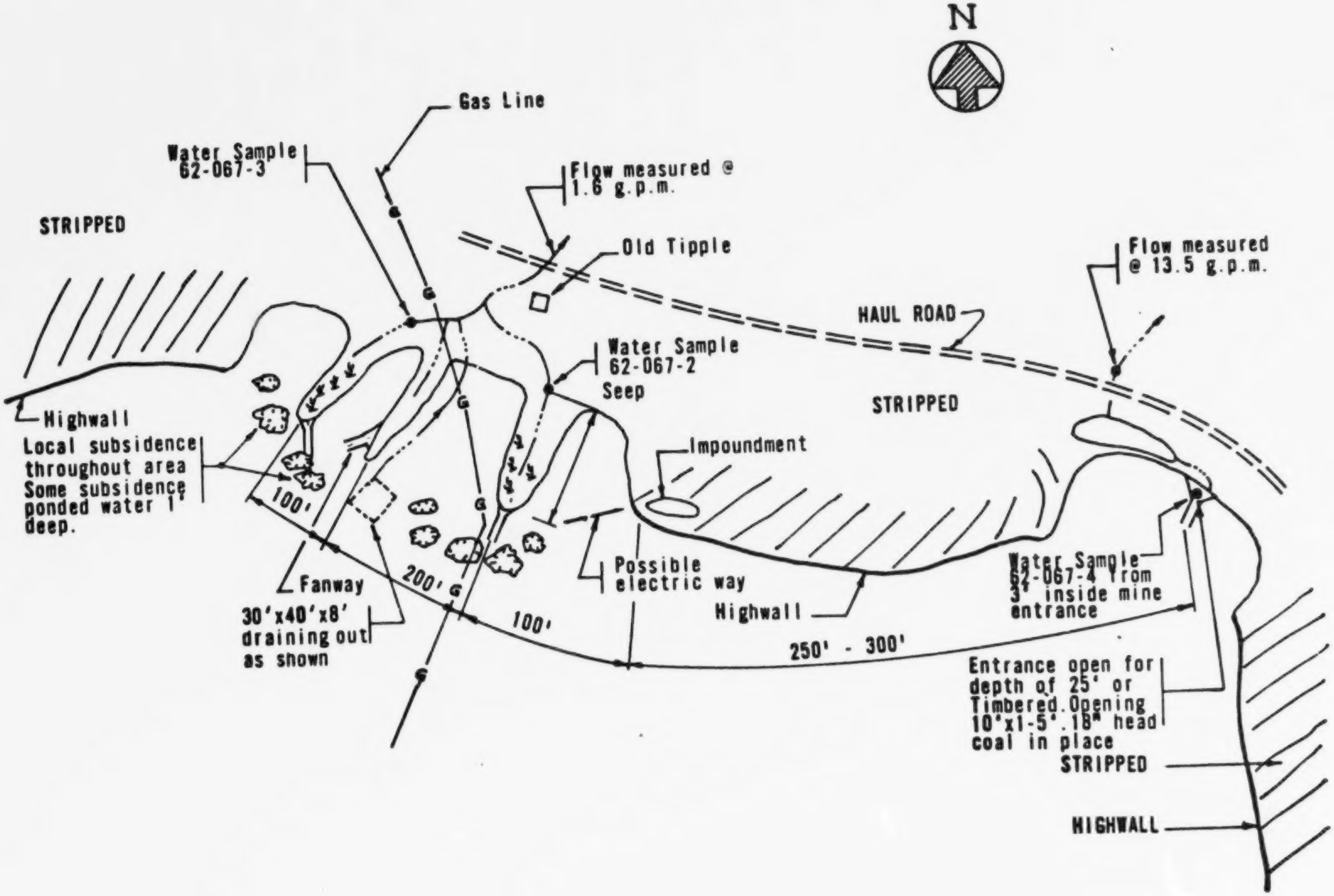
From available mapping of this area it would appear that drift operation was in an island and probably not too extensive.

Extensive local subsidences noted above area of drift openings (excluding drainway) and generally throughout 12' cover line and slightly above as though limestone cap has failed. This possible failure of limestone was noted above western most opening. Where highwall was exposed from stripping, no local subsidence noted; however, sliding or slipping of highwall cover can be noted. Reconnaissance of hill did not reveal fissures or subsidence.

Mine survey map of this site was not immediately available but is being researched.


N
Note this area not stripped
Highwall
Abandoned openings
Fanway
Possible electric way
Drainway
Locked gate
Highwall
500' to U.S.19
Highwall
Possible covered Mine mouth
Flow draining from Backfill

SKETCH - MINE NO. 62-067


N
Gas Line
Water Sample
62-067-3
Flow measured @
1.6 g.p.m.
STRIPPED
Old Tipple
Flow measured
@ 13.5 g.p.m.
HAUL ROAD
Water Sample
62-067-2
Seep
STRIPPED
Highwall
Local subsidence
throughout area
Some subsidence
ponded water 1'
deep.
Impoundment
100'
Fanway
200'
30'x40'x8'
draining out
as shown
100'
Possible
electric way
Highwall
Water Sample
62-067-4 from
3' inside mine
entrance
250' - 300'
Entrance open for
depth of 25' or
Timbered.Opening
10'x1-5'.18" head
coal in place
STRIPPED
HIGHWALL

SKETCH - MINE NO. 62-067

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

ORIGINAL AND RESURVEY COMBINED MINE No. 64-014

Date March 22, 1967

Sampler White and Thompson

Time 9:00 A.M.

Location One mile south of Clarksburgh on U.S. Route 19 behind Sunnycroft Country Club

State W. Va.

County Harrison TWP Clark

Section

Coord. 39° 15.5'N 80° 23.9'W

Map Reference Wolf Summit 7 1/2'

R.M.I.

Receiving Stream Davisson Run

Company Name or Owner James Dolan or Mrs. Rector (land), Sewell-Pocohontes Coal Co.

Coal Designation Pittsburgh

Elev. 1210' Area Mined 60 acres total

Reserves 12 acres

Mining Method Drift (abd) and Strip

Sample Number

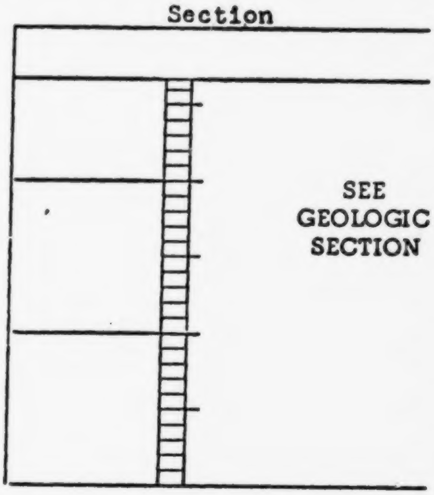
Surface, Ground, or Impoundment Ground

Method of Measurement ~~Estimate of Flow~~ Pipe and Bucket

Measurement of Flow 2 gpm.

pH Temp. Spec. Cond.

Section



Notes: One pit mouth that has been caved in and is draining below spoil bank at a rate of 2 gpm. There is a consolidated Gas 8" pipe line very close to the mine mouth. Some subsidence is present. To gain access to this mine approximately 1/4 mile of road would have to be built. A partial mine map is available and publicity would be very good. Overburden is 230'. the dip of the coal is NE fast; small amount of water and gob availabe for remedial work.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

ORIGINAL AND RESURVEY COMBINED MINE No. 64-016

Date March 22, 1967 Sampler White and Thompson

Time 9:30 A.M. Location

State W. Va. County Harrison TWP Clark

Section Coord. 39° 15.5'N 80° 23.5'W

Map Reference Wolf Summit 7 1/2' R.M.I.

Receiving Stream Davisson Run

Company Name or Owner James Dolan

Coal Designation Pittsburgh

Elev. 1250' Area Mined

Reserves

Mining Method Drift and Strip (abd)

Sample Number

Surface, Ground, or Impoundment Ground

Estimate of Flow 10 gpm

Measurement of Flow

pH Temp. Spec. Cond.

Section

SEE GEOLOGIC SECTION

Notes: This is the first pit mouth on the left as you get up on the strip. It is mine seal #121 which has been stripped out according to Government Surveys. It is draining into a small impoundment along the strip road at an estimated 10 gpm. The water is then going into a sink hole in the middle of the impoundment. No point of exit was found for this water below the strip; hence, no measurement was taken. The access to this site is excellent for heavy equipment and public relations for any work done here would be very good. A partial mine map is available but there is no aerial photo coverage. Some subsidence is present above the pit mouth.

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

ORIGINAL AND RESURVEY COMBINED

MINE No. 64-017

Date March 22, 1967

Sampler White and Thompson

Time 10:30 A.M.

Location

State W. Va.

County Harrison

TWP Clark

Section

Coord. 39° 15.5'N 80° 23.7'W
39° 15.6'N 80° 23.6'W

Map Reference Wolf Summit 7 1/2'

R.M.I.

Receiving Stream Davisson Run

Company Name or Owner James Dolan

Coal Designation Pittsburgh

Elev. 1250'

Area Mined

Reserves

Mining Method Drift (abd) and Strip

Sample Number 64-017-1 and 64-017-2

Surface, Ground, or Impoundment Ground

Estimate of Flow

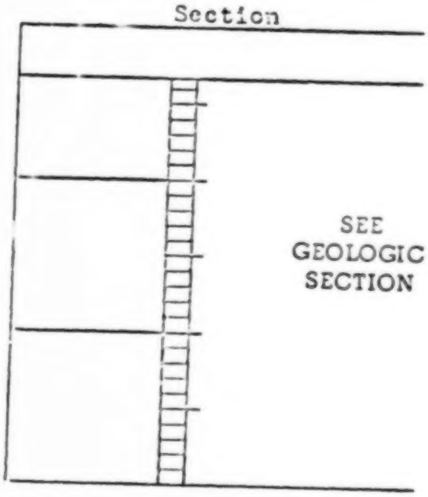
Measurement of Flow 64-017-1 = 32 gpm
64-017-2 = 26 gpm

pH

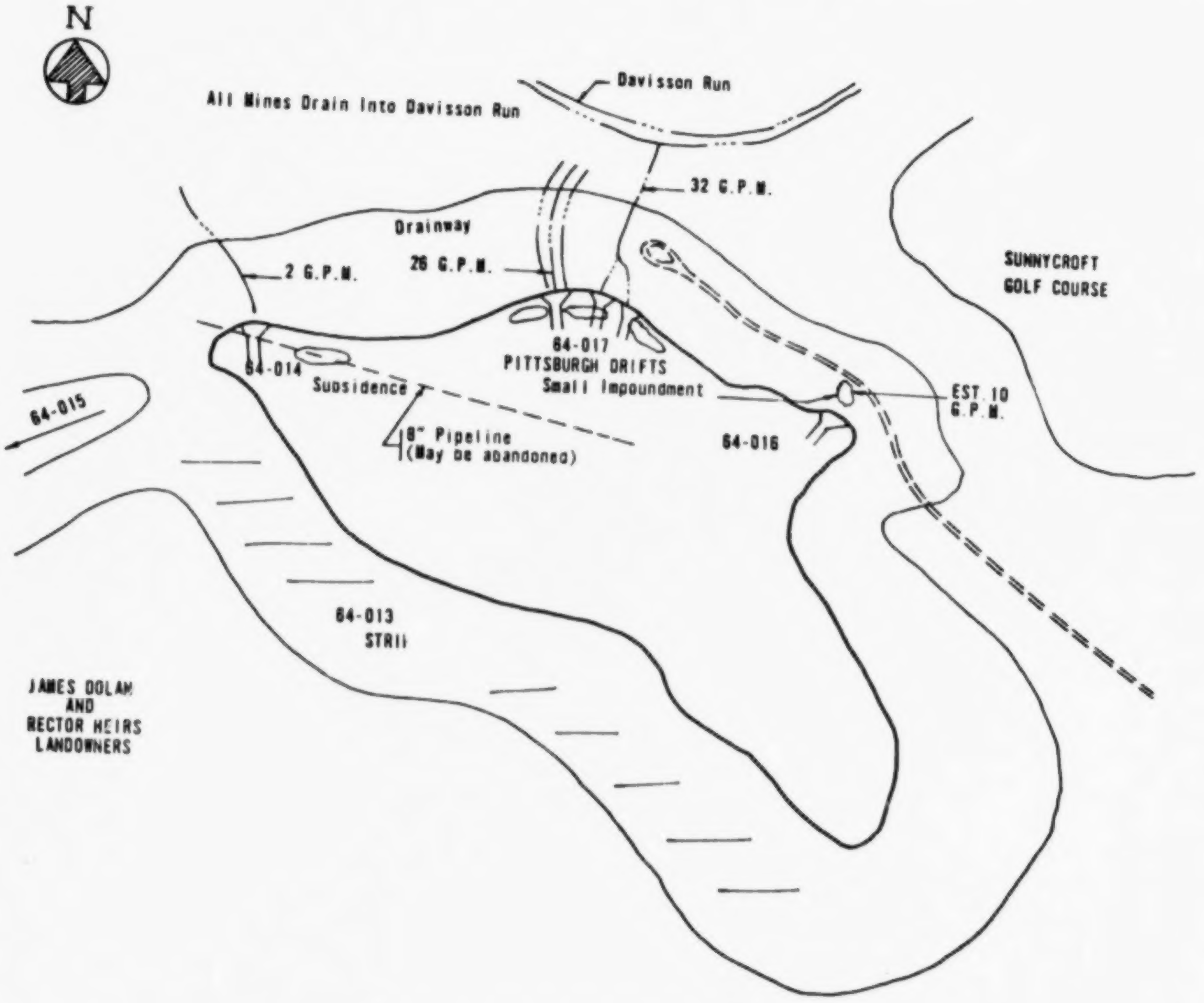
Temp.

Spec. Cond.

Section



Notes: There are three openings at this mine site, two of which are located by an old tipple. One of these is draining (64-017-1) at a rate of 32 gpm and the other is seeping. There is a small amount of gob scattered around the tipple, but most of it has been graded down. The third opening is draining through a cut in the backfill that has been left for a drain. The drainway is full of debris and evidently has been used as a dump. This drainway prohibits vehicular travel farther on the strip. The flow measured here (64-017-2) was 26 gpm. The access is good to all three openings, and public relations would also be good here. A partial mine map has been obtained, but there is no aerial coverage. Some subsidence is visible above the mine openings. This is a good prospect for the final twenty and possibly for one of the final three mine sites.


N
All Mines Drain Into Davisson Run
Davisson Run
32 G.P.M.
Drainway
2 G.P.M.
26 G.P.M.
SUNNYCROFT
GOLF COURSE
64-017
PITTSBURGH DRIFTS
Small Impoundment
EST. 10
G.P.M.
64-014
Subsidence
64-015
8" Pipeline
(May be abandoned)
64-016
64-013
STRIP
JAMES DOLAN
AND
RECTOR HEIRS
LANDOWNERS

SKETCH - MINES NO. 64-014, 64-016 and 64-017

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

ORIGINAL AND RESURVEY COMBINED MINE No. 64-015

Date March 28, 1967 Sampler Siems & Choy

Time 3:15 P.M. Air Temp. 64°F **Location**

State W. Va. County Harrison TWP Clark

Section Coord. 39°15.5' N 80°24.3' W

Map Reference Wolf Summit 7 1/2' R.M.I.

Receiving Stream Davisson Run

Company Name or Owner Muncy Mine

Coal Designation Pittsburgh

Elev. 1260' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 64-015-1
64-015-2

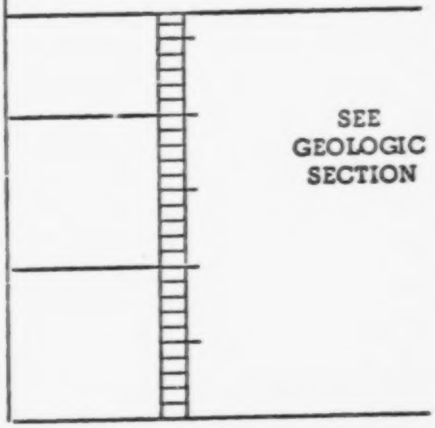
Surface, Ground, or Impoundment Ground

Estimate of Flow

Measurement of Flow 7 gpm & 2.5 gpm

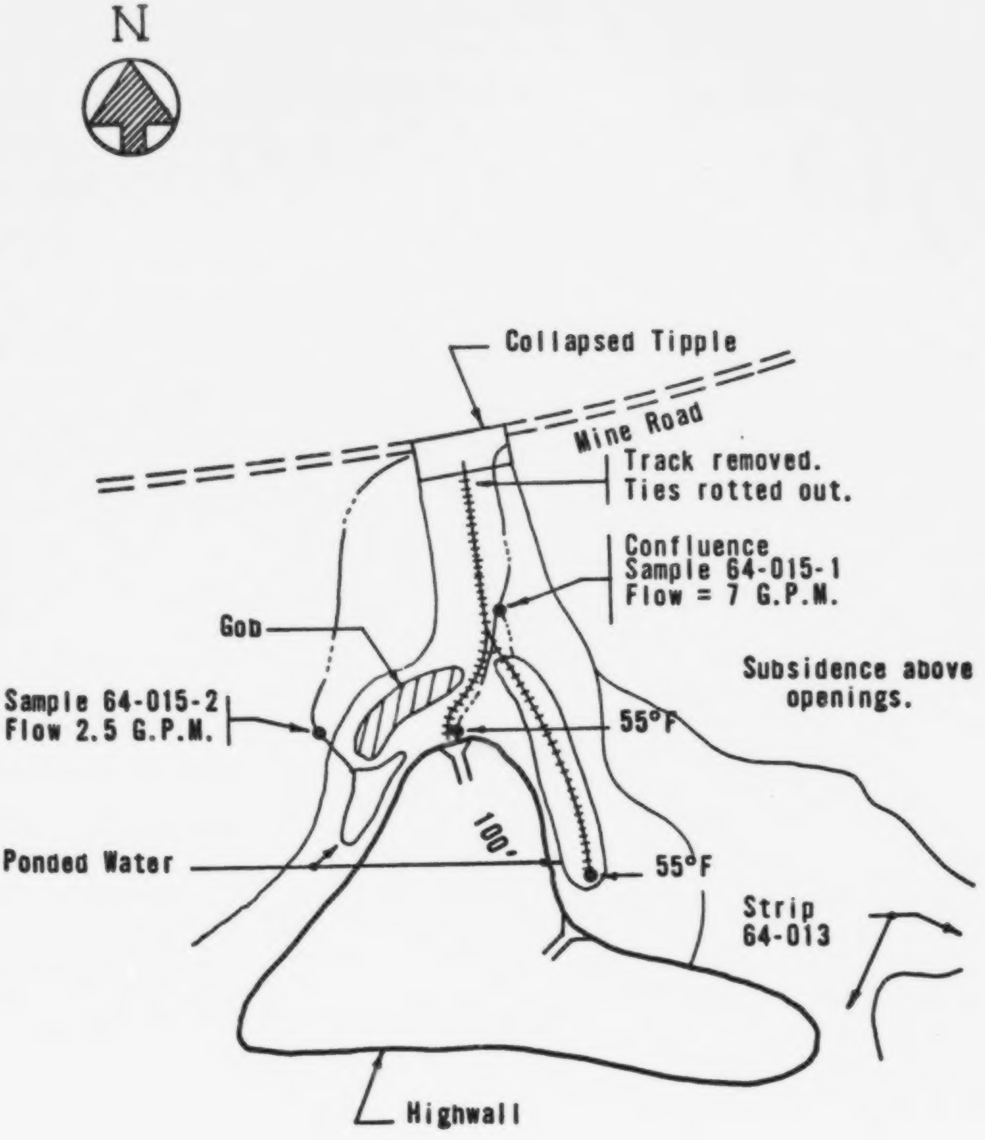
p^H Temp. Spec. Cond.

Section



SEE GEOLOGIC SECTION

Notes: Two openings, both closed by sloughage. Both draining. Water ponded against face of highwall. Access difficult but could be gained if access road to collapsed tipple is rehabilitated.


N
Collapsed Tipple
Mine Road
Track removed.
Ties rotted out.
Confluence
Sample 64-015-1
Flow = 7 G.P.M.
Gob
Subsidence above openings.
Sample 64-015-2
Flow 2.5 G.P.M.
55°F
100'
Ponded Water
55°F
Strip
64-013
Highwall

SKETCH - MINE NO. 64-015

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

ORIGINAL AND RESURVEY COMBINED MINE No. 64-018

Date March 28, 1967 Sampler Siems and Choy

Time 9:00 A.M. Location

State W. Va. County Harrison TWP Clark

Section Coord. 39° 16.4'N 80° 25.3'W

Map Reference Wolf Summit 7 1/2' R.M.I.

Receiving Stream Davisson Run

Company Name or Owner Clifford Davis

Coal Designation Pittsburgh

Elev. 1260' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 64-018-1 64-018-2

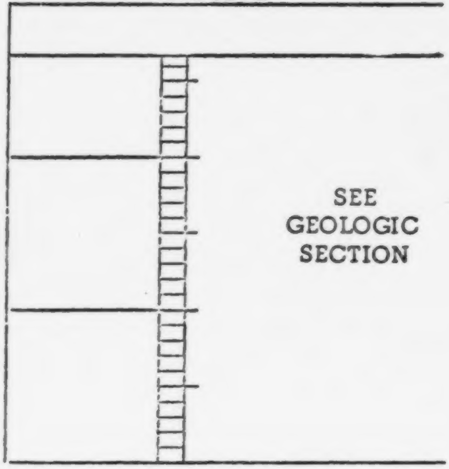
Surface, Ground, or Impoundment Ground

Estimate of Flow

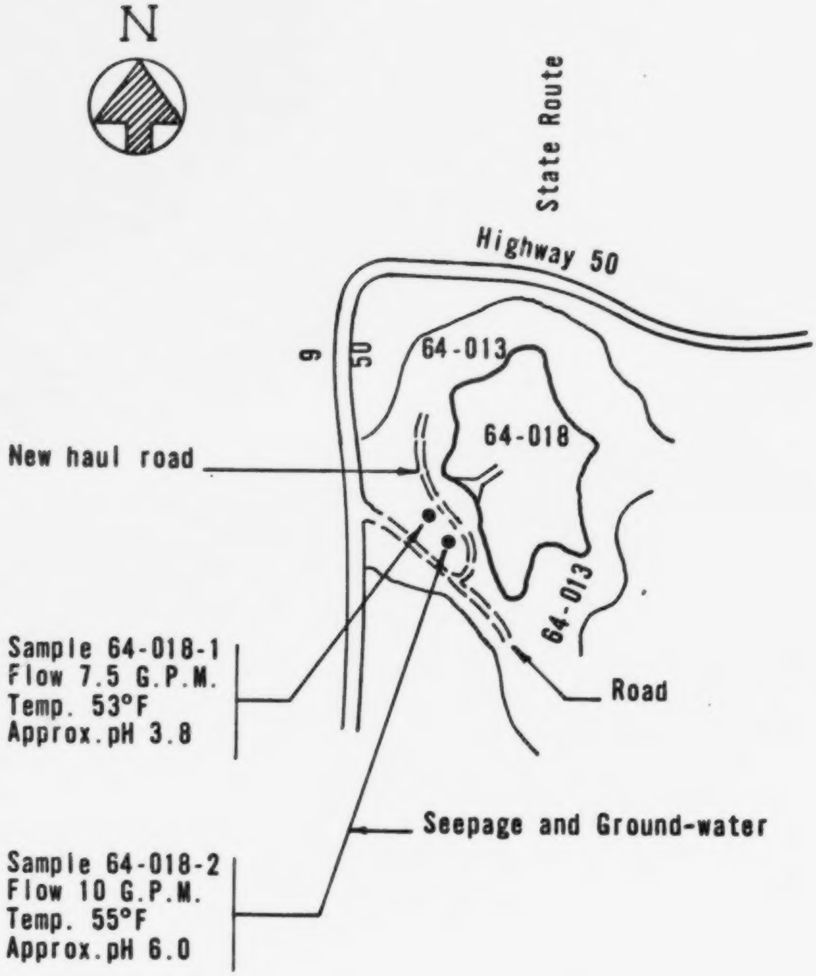
Measurement of Flow 7.5 gpm 10 gpm P & B

pH Temp. Spec. Cond.

Section



Notes: Mine drainage from two locations. Opening obliterated. Recent grading operations for possible haul road located over opening make it difficult to determine exact location of mine opening. Sample (64-018-1) taken. Flow is draining through reclaimed land of previous strip operation.


N
State Route
Highway 50
9
50
64-013
64-018
New haul road
64-013
Road
Sample 64-018-1
Flow 7.5 G.P.M.
Temp. 53°F
Approx.pH 3.8
Seepage and Ground-water
Sample 64-018-2
Flow 10 G.P.M.
Temp. 55°F
Approx.pH 6.0

SKETCH - MINE NO. 64-018

MONONGAHELA RIVER MINE DRAINAGE

REMEDIAL PROJECT

MINE INVENTORY CHECK LIST

ORIGINAL AND RESURVEY COMBINED MINE No. 64-020

Date March 28, 1967 Sampler Siems and Choy

Time 10:00 A.M. Air Temp. 62°F Location

State W. Va. County Harrison TWP Clark

Section Coord. 39° 16.4'N 80° 25.2'W

Map Reference Wolf Summit 7 1/2' R.M.I.

Receiving Stream Davisson Run

Company Name or Owner Clifford Davis

Coal Designation Pittsburgh

Elev. 1260' Area Mined

Reserves

Mining Method Drift (abd)

Sample Number 64-020-1

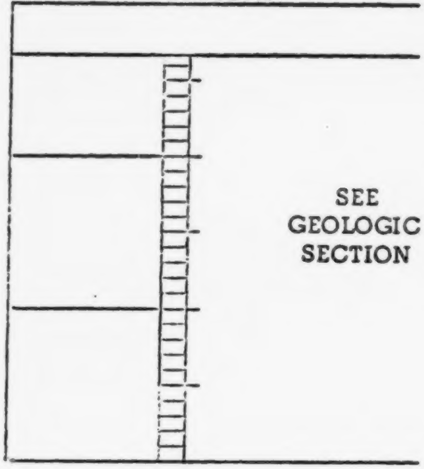
Surface, Ground, or Impoundment Ground

Estimate of Flow

Measurement of Flow 12 gpm P & B

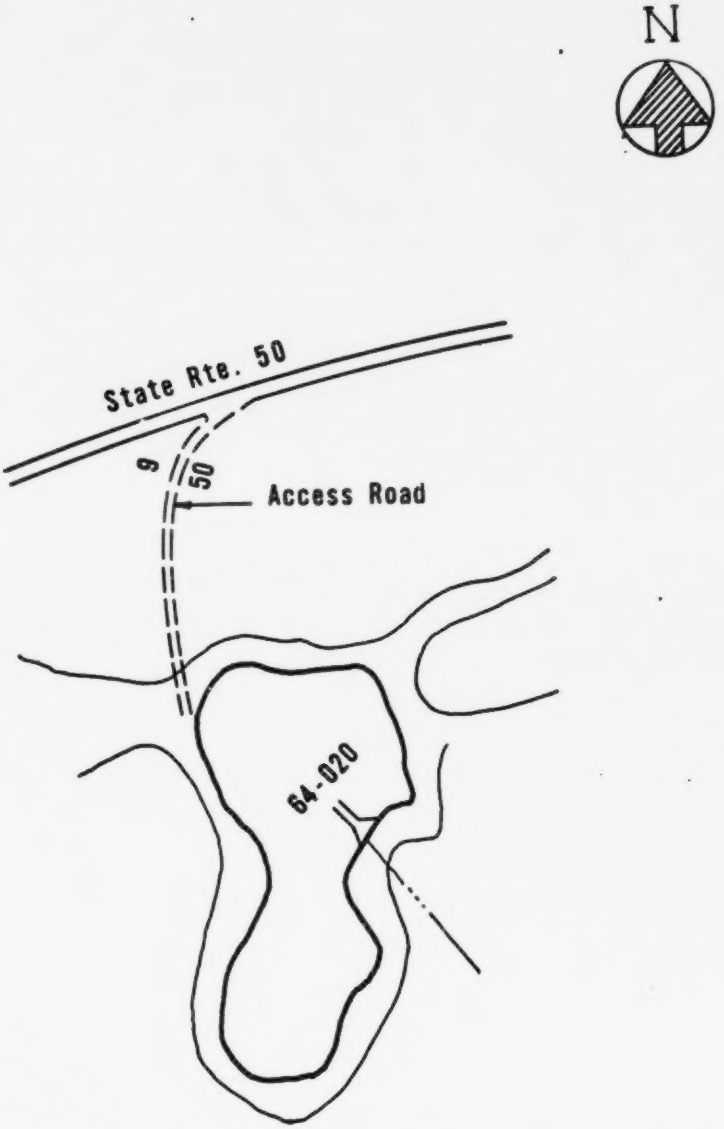
pH Apprx. 6.0 Temp. 55°F Spec. Cond.

Section



SEE GEOLOGIC SECTION

Notes: Entrance collapsed. Effluent flows in channel through strip. Sample (64-020-1) taken 200' from face of highwall.


N
State Rte. 50
9
50
Access Road
64-020

SKETCH - MINE NO. 64-020